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# The International Journal of Orthodontia

*Editor: Martin Dewey, D.D.S., M.D.*

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VOL. II

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## ORIGINAL ARTICLES

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### THE FACTOR OF HEREDITY IN MALOCCLUSION

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Exceptional Children.*

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WHEN applying to orthodontics the modern system of diagnosing by exclusion of suspected causative factors, which is adopted in obscure pathological conditions, one finds in several offspring of the same parents, the same or almost the same abnormal conditions, such as lack of arch development, malalignment, retarded retention of deciduous teeth, etc., it must be plausible that it is not likely that the various offspring have indulged in the same perverted habits, and that these were the initial causes, "the original etiologic factor," of the existent deviation from the normal.

Why should one assume, for instance, that two children, born ten years apart, as shown in the first case illustrated below, have indulged in the same habit which might create an abnormality, when it is fair to assume that had such a habit brought on the abnormality in the older child (a girl in this case), the parents would have surely tried to interfere with the creating of a similar habit in the second child (also a girl) born ten years later, and at a time when the result of this presumable habit, which played such havoc with the teeth and face of the first child, was quite noticeable? When the full complement of teeth, expected at a given age, is found in such mouths, and therefore early extraction of permanent teeth can be excluded as a factor of the abnormality; when the history of the cases shows that, while there was premature extraction of some of the deciduous teeth (no accurate statement as to which could be obtained) in the older of the two children, no tooth whatsoever, neither deciduous nor permanent, was extracted (except deciduous teeth, when ready to shed) in the younger sister, and therefore premature extraction of deciduous teeth can also be excluded as the factor of this similar abnormality in at least one of the sisters, the younger girl, showing thereby more conclusively that the abnormal-

ity in the younger sister existed despite the lack of extraction, there is no reason to conclude that extractions of deciduous teeth have produced it in the older sister; furthermore when in the same case a facial deviation from the normal (surely correlated with the oral abnormality), such as a continuous diminution of the opening of the nares, was in progress in the older sister until, at the age when the casts were obtained, the nostrils were almost closed, and that a similar condition is found to be in progress in the younger sister, is there any valid reason to assume that "perverted habits" have been at the bottom of all these troubles, and is it not more reasonable to admit that something further back, perhaps in uterine life or even before that, something inherent in one or the other parent and transmitted to the offspring, has caused abnormalities of the same type in several offspring?

I am, of course, aware that other factors such as artificial feeding during infancy, adenoidal vegetations, hypertrophied tonsils, etc., may produce abnormalities and that it may be contended that even if "perverted habits" have not caused the same, it must not necessarily be concluded that heredity is the factor. One must however not lose sight of the fact that aside from bottle feeding, to which is attributed a certain type of abnormality which I have especially refrained from including in this brief, feeling that it can be pointed out as a postnatal cause and as one tending to create a habit, the other above cited factors and many more of the same character are of such nature that if we look at them in the light of the knowledge obtained from the work on normal and abnormal development of Gudernatsh, Abderhalden, Cotronei, Romeis, and others, showing the effects of lack or abundance in thyroid or thymus secretion and other ductless glands upon growth and differentiation of the species, we may well ask ourselves whether these very factors, held responsible for the abnormalities, are not themselves due to some lower or higher power of proliferation, of the original cell creating the tissues involved, inherited from a parent lacking or abounding in some of the mentioned secretions, and transmitting this tendency to the offspring. In other words, if we are willing to concede that proper secretion of some of the ductless glands is responsible for proper calcium metabolism during pregnancy, and we are willing to concede that this governs the proper development of the osseous structure of the body *in utero*, we must admit that the jaw bones and teeth will be affected as part of the structure governed by calcium metabolism; further, if this is admitted, we must concede that the proper or improper functioning power of the glands governing calcium metabolism must be due to the quality of the parent cell and therefore is also inheritable, and hence even if proper growth was not influenced during intrauterine life and the abnormality begins to make itself noticed later in childhood or in adult life only, which is very rare, it still may be inherited, originally, in spite of the fact that some perverted habit might seem to have caused it. Especially must this appear true when the same type of abnormality is duplicated or triplicated in various offspring of the same parent.

To accentuate the truth that the theory of "perverted habits" is wrongly accepted in the etiology of malocclusion in preference to the theory of "prenatal causes," I am giving herewith some records taken from a number of cases observed by me.



I. A. Z. age 26 (Fig. 1a) is a married sister of F. S. age 16 (Fig. 2a), and in the casts of both sisters the lack of maxillary development is apparent, resulting in both cases in bilateral mesiocclusion (Figs. 1a, 1b, 2a and 2b), associated in both cases with almost the same cusp malrelation, strikingly so on the right side (Figs. 1b and 2b).



Fig. 1-A.

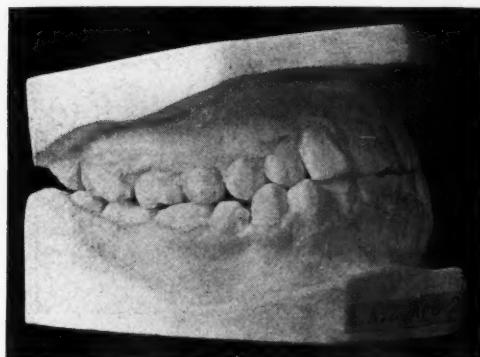


Fig. 1-B.

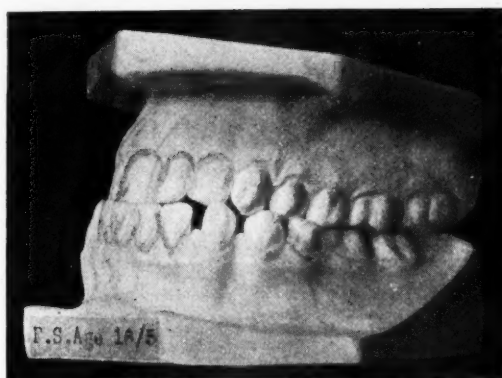


Fig. 2-A.

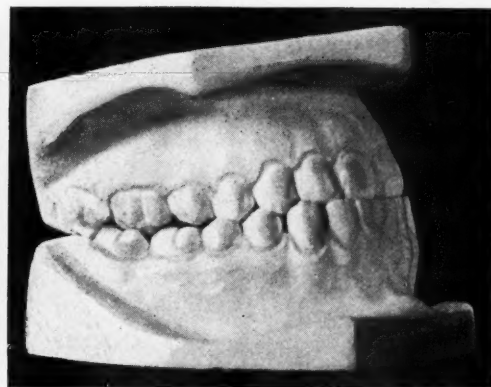


Fig. 2-B.

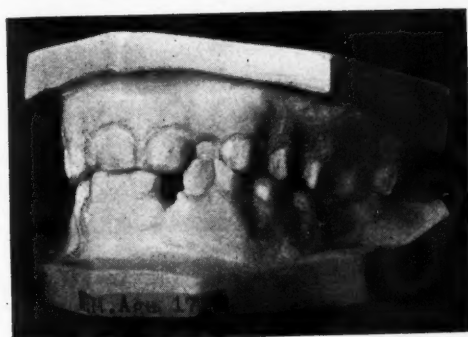


Fig. 3.

M. M. age 17 (Fig. 3) and B. M. age 25 (Fig. 4) two sisters, show linguo-version, the first of the lateral and the second of the cuspid on the left side of the maxilla, the other teeth being in fair alignment. Lack of teeth through extraction, in the mandible, prevents an intelligent consideration of the mesiodistal relation in these cases for purpose of comparison.

In a family of six children, three of them, B. W. age 17 (Fig. 5), S. W. age 19 (Fig. 6), and W. E. W. age 26 (Fig. 7), present to a lesser or greater degree the same unproportionate maxillo-mandibular relation seen, although not



Fig. 4.



Fig. 5.



Fig. 6.

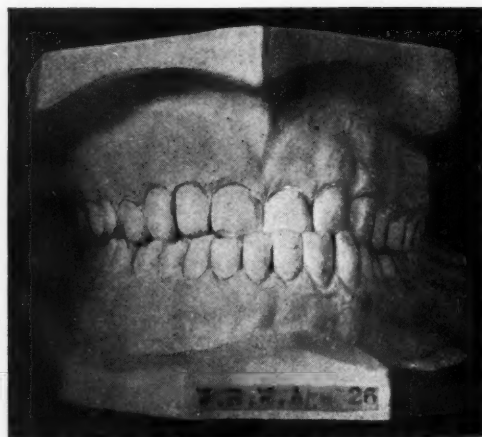


Fig. 7.



Fig. 8.

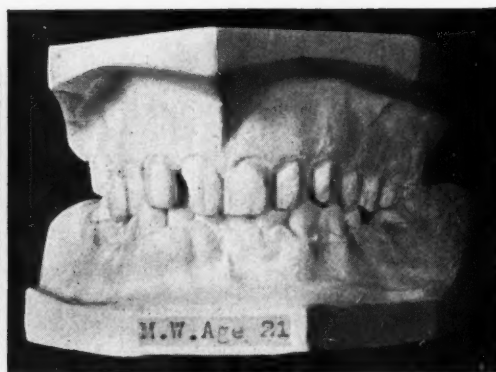


Fig. 9.

very distinctly because of lack of too many teeth, in the cast of M. W. age 55 (Fig. 8), their father, whereas the other children while not having correct occlusion, are not afflicted with the same condition found in the father, and have

rather the arch relation found in the mother and of which I show the more pronounced case in M. W. age 21 (Fig. 9).

The idiosyncrasy of retaining until a late age deciduous teeth is also shown in two members of this family. In one, S. W. age 19 (Fig. 10), can be seen the retention at this age of the deciduous upper left lateral and left cuspid as well as right cuspid, the permanent left lateral and cuspid not having erupted, neither the permanent left lateral, while the permanent right cuspid is in linguo-torsoversion, and the Röntgenograms of the parts showing no sign of the missing permanent teeth (Figs. 10a and 10b); in the other M. W. age 21 (Fig. 11), the lower right deciduous cuspid is retained at this late age in spite of the per-

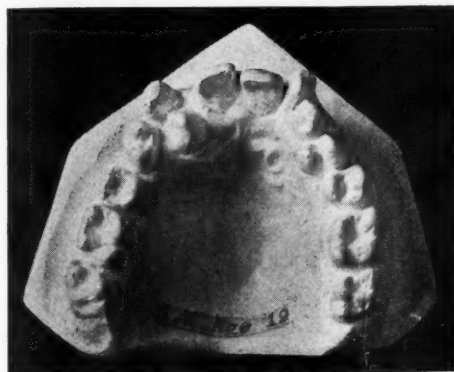


Fig. 10.



Fig. 10-A.



Fig. 10-B.

manent cuspid having erupted, so causing the crowded condition which places the right second bicuspid in linguo-torsoversion.

In conclusion I wish to say that I do not care to go on record as claiming that all causes of malocclusion are prenatal, nor that perverted habits play no part in the etiology of malocclusion, but I am sure that too often "perverted habit" is accepted as a cause when it really is only the effect of a predisposition leading to that habit. Accurately obtained histories will show that almost always in cases of maxillary or mandibular anterior labioversion the desire of sucking the lower lip, in the first case and the upper lip in the second case, between the teeth was noticed later than the original existence of the anatomical



malrelation, and the persistence in the habit was due exactly to the effect of a space, be this ever so unnoticeable in the beginning, existing between the upper and the lower teeth, which allowed the lower lip to be drawn up in the first case and the upper lip to be drawn down in the second case, between the teeth without any effort,—in fact this space acting as a comfortable resting point for the lower or upper lip, as the case may be. This persistence in the established habit creates now an adjuvant cause, which originally, as stated above, was the effect of a predisposition. To illustrate this I will take a case R. Z., a girl today three years and seven months old, which I had an opportunity to observe very closely, from birth on. As early as it was practicable,—at the age of two years and ten months, I obtained casts of the mouth (Figs. 12, 12a and 12b). I am sorry that I could not obtain casts earlier as the now existing labioversion of the upper centrals and mesio-linguo-torsoversion of the upper laterals and mesio-linguo-torsoversion of the lower centrals, leaving a general impression of a slight upper anterior labioversion, was noticeable to me long before the time when the casts were obtained, soon after the eruption of all the anterior deciduous teeth. The

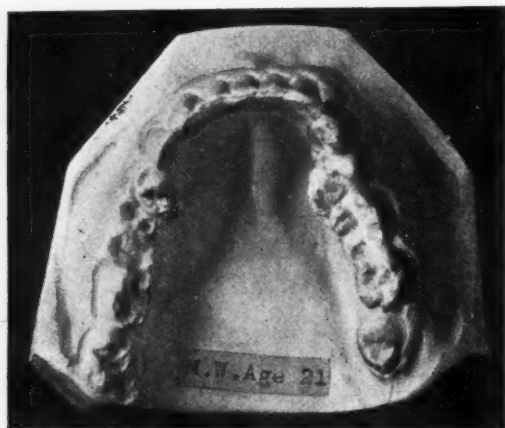


Fig. 11.

child had a quite uneventful infant life, none of the infancy or early childhood illnesses, with the exception of lack of appetite, malaise, and temperature at the periods of tooth eruption, which almost all had to be aided by gum lancing, after which operation the temperature fell abruptly and the child returned to normal condition almost instantly. The child was entirely breast fed, never knew what a milk bottle or a nipple, hard or soft, was; took to the cup, for milk and other liquids, as soon as weaned from the mother's breast; was given solids, hard, dry toast, etc., as a goodly part of her diet as early as possible,—and in presence of all these extraneous aids for development of jaw-bone, presents a progressive upper anterior labioversion, surely in this case not brought on by the nipple of the milk bottle, and what is more to the point regarding the reason for which I am bringing this case as an illustration, only in the last half year or so, has this child acquired the habit of drawing her lower lip up between her teeth and of placing her thumb in the same place. She did not show the least tendency to these "perverted habits" before she was quite past three years, not until the space between her upper and lower teeth was quite more pronounced than is noticed in the casts shown.

The histories of other analogous cases being obtained by careful elicitation, trying as hard as possible to obtain accurate and truthful narratives, show similar sequence in the formation of the perverted habit presumably causing malocclusion. While some error might be claimed in the result of observation by lay parents as to whether the anatomical malrelation preceded the habit or *vice versa*, I am sure that at least in this one case described above (Figs. 12, 12a and 12b) there is no mistake; it was accurately and carefully observed by me. It may not be amiss to state in conjunction with this case and in support of the principles



Fig. 12.



Fig. 12-A.

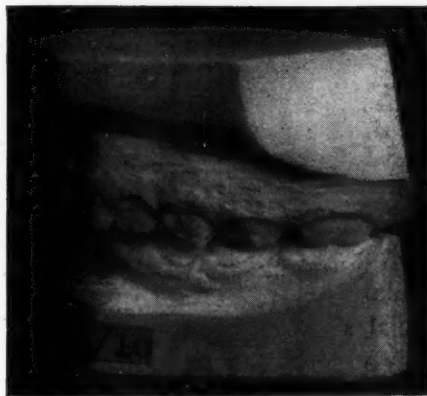


Fig. 12-B.

upheld in this writing that I, the father of the child, show a labioversion of the upper anterior teeth, which were it not for the fact that several upper posterior teeth were extracted in childhood, would be a good deal more pronounced. Perhaps inheritance may by right be blamed for this analogy in father and child.

When the science of orthodontics will have definitely accepted the prenatal cause as an etiological factor in malocclusion, the most important work that is yet to be done in orthodontics, the preventative measures, will be given the attention rightfully deserved.

## THE EVOLUTION OF THE PRINCIPLES OF APPLIANCES

BY JOSEPH D. EBY, D.D.S., ATLANTA, GA.

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### PART I.

WHEN the science of orthodontia has been fixed, when the full knowledge of its divisions is completed, the crowning work will be the production of the ideal appliance.

This ultimate state will not be a memorial to one great mind, for such cannot be, any more than a structure can be more dependent upon the finishing touches than it is upon the first stone laid in its foundation.

The capstones of this great memorial—Perfected Orthodontia—will bear the names of the great leaders with justice and with the pride of all the profession, but supporting them will be the contributions of every other man who has ever separated any fact as a fixed part of the science.

In collecting the substance of this science from all of its branches, perfected orthodontia will embody the correct knowledge of those great histological and physiological factors to which every other phase must conform. The basic principles of normal development, normal occlusion, etc., which govern diagnosis, also etiology, nomenclature, with the other allied branches, are being rapidly perfected.

While there is a great field for further research, we have already attained the correct working knowledge of the physiological principles of tooth movement and bone development by mechanical stimulation.

It is through the intimate collaboration of these individually perfected parts that the specialist "feels" orthodontia, and is enabled through the mechanical means at our present disposal to effect the best results.

In considering the dynamics of tooth movement, it is useless to review the evolutionary processes through which this work has passed.

The question of stimulation vs. strangulation has been settled.

Even as the natural forces, abnormally applied, produce acquired types of irregularity by mild constant forces, so it is now universally recognized that the artificial stimulation of the bone cells demands a mild, constant pressure.

Too great significance cannot be attached to these two features, for physiologically correct tooth movement can only occur as the result of correctly applied, mild and constant forces.

In the study of the kinds of applied forces there are two which are subject to ideal control,—the spring and the elastic.

At present, nuts, ligatures, etc., are employed in conjunction for certain lines of tooth movement, but in the writer's opinion these means of traction will be entirely eliminated in the ideal appliance, replaced exclusively by the spring and the elastic.

In the ideal appliance must be found:

1. Stability of attachment. Inability of patient to remove appliance.



2. Greater resistance or a counter-control of resistance in the anchor regions against the sections of active movement.

3. Ability to control the teeth on individual paths of movement toward the normal, unless segments of arches may be similarly controlled collectively.

4. Susceptibility to reasonable alteration to meet advancing developments, although the delicacy or difficulty of construction should not be the primary consideration.

5. A mild pressure producing a stimulation of the osteoclast, which cannot be sufficient to effect the pericemental circulation or to bend bone or produce pain.

6. To be so adjustable in tightening that the exact degree of activity can be measured and controlled at regular tightening intervals.

7. A pressure so constant as to establish and maintain a uniform activity in the cells and to prevent the shocks which occur with intermittent forces.

8. To eliminate all forms of leverage such as produced by a one point of contact pressure against the crown of a tooth, to eliminate tipping of the teeth with no apical movement, which is required in the greater percentage of appliances.

9. An attachment which can produce bodily root movement in any direction required.

10. Cleanliness, freedom of contact against the soft tissues, and injury to the enamel.

11. To subserve, partially at least, for preliminary advantages, the correct principles of retention.

12. To be free from bulkiness and be inconspicuous.

The developments in regulating apparatus have sprung from two sources, "fixed" and "removable" appliances.

Both types, beginning in clumsy, uncontrollable, speculative designs soon presented two reversed conditions, i.e., in the "fixed" types stability of anchorage was gained at the expense of poorly and painfully applied forces, whereas in the removable types, the use of the mild, constant, painless, normally rapid stimulus of the spring was gained at the almost defeating expense of unstable attachment.

In realizing these facts, the greater number of designers of appliances determining that positive anchorage being the first asset, the removable types were condemned and their efforts were devoted to perfecting the kinds and lines of applied forces to meet this first requisite, viz., stationary anchorage and attachments.

Among our great pioneer scientists who espoused the "fixed" types and developed various designs of apparatus were men who contributed a great amount of work in founding the fundamental principles upon which the superstructure of orthodontia for all time will be based.

The work of these men and their followers has placed fixed appliances in the ascendency and caused a prejudice to arise against the removable types as a result of which, for years, the removable appliances were practically not recognized.

During this time, however, Dr. Jackson, recognizing the values of removable appliances, has developed his system which, after fifteen years of perfection in his hands, has proven to the world (in conjunction with the works of others) that the spring force properly controlled and anchored is the ideal means for

the transmission of mechanical stimulus to produce cellular activity, without any shock, injury or pain, and subservient to the correct principles of physiological processes by which tooth movement is effected.

Much has been written on the advantages of "fixed" and "removable" appliances and *vice versa*. These articles have been written mainly in the defense of the one type or the other, dogmatic conclusions have predominated, also a general unwillingness to admit the disadvantages of either.

Despite these positions taken by the champions of the different systems, the indomitable advance of science is gradually blending the best qualities of all methods into a new type of apparatus which will be neither "fixed" nor "removable" but will be almost equally dependent in theory, fact and credit to the two old classified forms.

These new appliances, whether they resemble the old "fixed" or the old "removable," are essentially fixed-removable, and out of this new era which we are just approaching will eventually be evolved the ideal methods.

Let us compare not the advantages vs. the disadvantages of the two types but instead the relative advantages and disadvantages.

#### FIXED APPLIANCES.

*Advantages.*—Security of attachment to the malposed tooth. Control of individual tooth movement. Firm anchorage or a resistance to overcome the applied force which may be intramaxillary or intermaxillary. Appliance of small bulk and located in part of the mouth which is least sensitive. *Disadvantages.*—Uncleanly and injurious to both hard and soft tissues. Forces of screw and ligature are tightened to maximum pressure and diminish maximum force; has an intermittent and limited use of spring force. Liability of displacement of anchor teeth in all directions. Danger of tipping teeth. Very conspicuous.

#### REMOVABLE APPLIANCES.

*Advantages.*—Cleanliness. Employment of spring force, which is mild, constant and painless; has great range of application and produces movements which are normally rapid and physiologically correct. Readily subject to alterations to meet advance developments, anchorage easily obtained to overcome the resistance of the malposed teeth. Adaptability of designs to meet all conditions. Inconspicuous. *Disadvantages.*—Insecure attachment. Difficulty in control of individual tooth movement. Danger of tipping teeth.

In recognition of these relative facts, the two types are now undergoing changes, the new attachments and designs of both types of appliances are fixed in anchorage, although removable, so as to employ the spring and to reduce the use of the screw and ligature,—thus have they become fixed-removable.

In the creation of this new type of appliance by combining the advantages and eliminating the disadvantages of the fixed and removable, we have reached the point where the future is to be devoted to the perfection of style and design, to balance out the requirements and practical application. This epoch through which we are passing will leave history to record the fixed appliance and the removable appliance, giving them equal credit for their great contributions to their successor, the fixed-removable.

(To be continued.)

# FACE FACTS

## A Clinical Study of Dento-Facial Deformities

(Continued from page 138)

BY B. E. LISCHER, D.M.D., ST. LOUIS  
*Professor of Orthodontics, Washington University Dental School*

A SUPERFICIAL survey of the existing varieties of man probably favors the acceptance of *the principle of endless deviation*, but it is worthy of note that recent advances in the science of anthropology continue to support the doctrine of "*the fundamental unity of the human species*."

"Race," says Topinard, "in the present state of things is an abstract conception, a notion of continuity in discontinuity, of unity in diversity. It is the rehabilitation of a real but direct unattainable thing."

Using the word *race* in this sense, Ripley maintains that "there are three ideal racial types in Europe—the continent of all others wherein social phenomena have attained their highest and most complex development." The present varieties of man in Europe have sprung from these three types, known as the *Teutonic*, *Alpine* and *Mediterranean* (Fig. 13).

THE THREE EUROPEAN RACIAL TYPES

RACE	HEAD	FACE	HAIR	EYES	STATURE	NOSE
1. Teutonic	Long	Long	Very Light	Blue	Tall	Narrow; aquiline.
2. Alpine (Celtic)	Round	Broad	Light Chestnut	Hazel Gray	Medium Stocky	Variable; rather broad, heavy.
3. Mediterranean	Long	Long	Dark brown or black	Dark	Medium Slender	Rather broad.

"They are not radically distinct seeds which, once planted in the several parts of Europe, have there taken root; and, each preserving its peculiarities intact, have spread from those centers outward until they have suddenly run up against one another along a racial frontier. Such was the old-fashioned view of the races, in the days before the theory of evolution had remodelled our ways of thinking—when human races were held to be distinct creations of a divine will. We conceive of it all quite differently. These types for us are all necessarily offshoots from the same trunk. The problem is far more complex to us for this reason. It is doubly dynamic. Upbuilding and demolition are taking place at the same time. By our constitution of racial types we seek to simplify the matter—for a moment to lose sight of all the destructive forces, and from obscure tendencies to derive ideal results. We picture an anthropological goal which might have been attained had the life conditions only been less complicated."

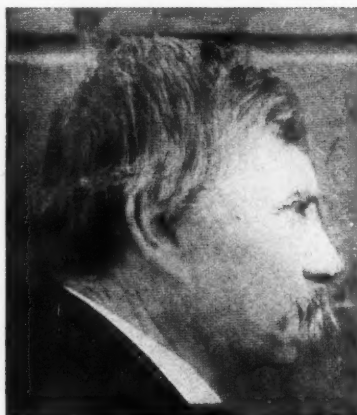
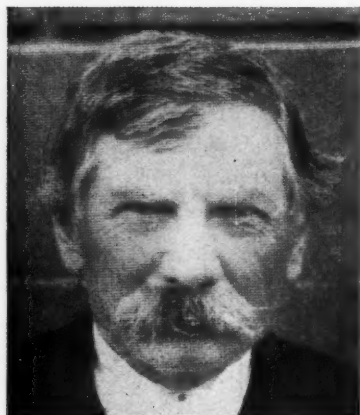
### IV. ABNORMAL FACIAL TYPES

Sundry normal variations of the head have already been briefly described. All of the facial features thus referred to are equally subject to *abnormal varia-*

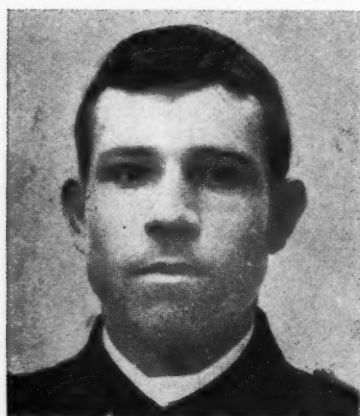




Teutonic type (Norway). Pure blond.



Alpine type (Austria). Blue eyes, brown hair. Index 88.



Mediterranean type (Palermo, Sicily). Pure brunet. Index 77.

Fig. 13.—The three European racial types. (After Ripley.)

tions of form and structure. The most obvious examples of maldevelopment of the head are the *microcephalous* and *hydrocephalous* crania of idiocy (Fig. 14). The eyes, ears, nose, teeth and jaws are frequently deformed in such cases; asymmetry is so common that it becomes the rule.

In his work on "*Plastic Surgery*," Kolle adopts the following classification for deformities of the auricle, eyelids and nose:

*Auricle.*—Microtia, Macrotia, Polyotia and Malposition of the auricle.

*Eye-lids.*—Ectropion, Epicanthus, Ptosis and Ankyloblepharon.

*Nose.*—Superior, middle or inferior third deficiency; Superior or inferior half deficiency; Total anterior deficiency; Lobular, interlobular and subseptal deficiency; Alar deficiency (unilateral and bilateral).

But the principal purpose of these papers is to analyze some of the more minute details of certain types of dento-facial deformities which are entirely



Fig. 14.—Microcephalic and hydrocephalic heads; female 28 years, male 8 years old. (After Krukenberg.)

ignored by investigators lacking orthodontic training, and which are frequently underestimated even by orthodontists.

A common anomaly of facial expression, due usually to malposition of the incisor teeth, is shown in Fig. 15. Of course there are many variations of this form of abnormality, differing in degrees from that of very slight malposition of the teeth and barely recognizable *abnormal function of the lips*, to that of extreme malposition of the teeth and *material malformation of the lips*. Not infrequently the adjacent alveolar process is involved, for it is obvious that a crowded dental arch necessarily implies an arrest of development in the supporting structures.

On the other hand, the malocclusion of the teeth may be of a type where the deviations from normality are more symmetrical, therefore less evident externally. Fig. 16 represents a profile of this type with *normal lip function*, though the form and relations of the lower lip and mentolabial sulcus to the other features

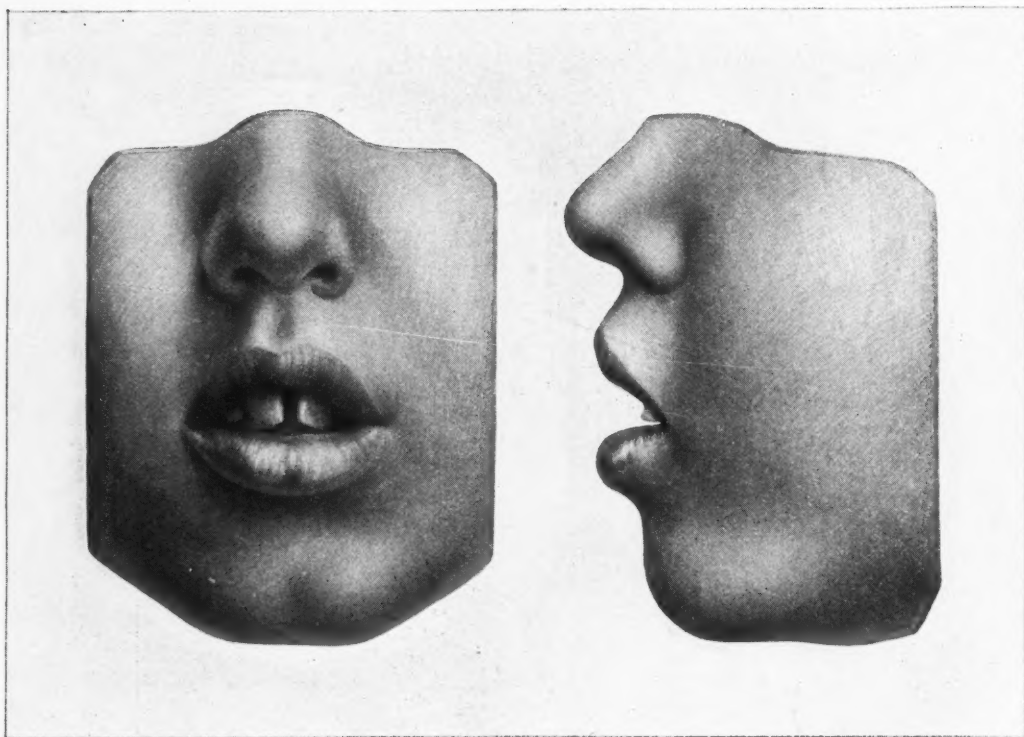


Fig. 15.—Shows abnormal function of the lips, due to malposition of the incisors; male 10 years old.

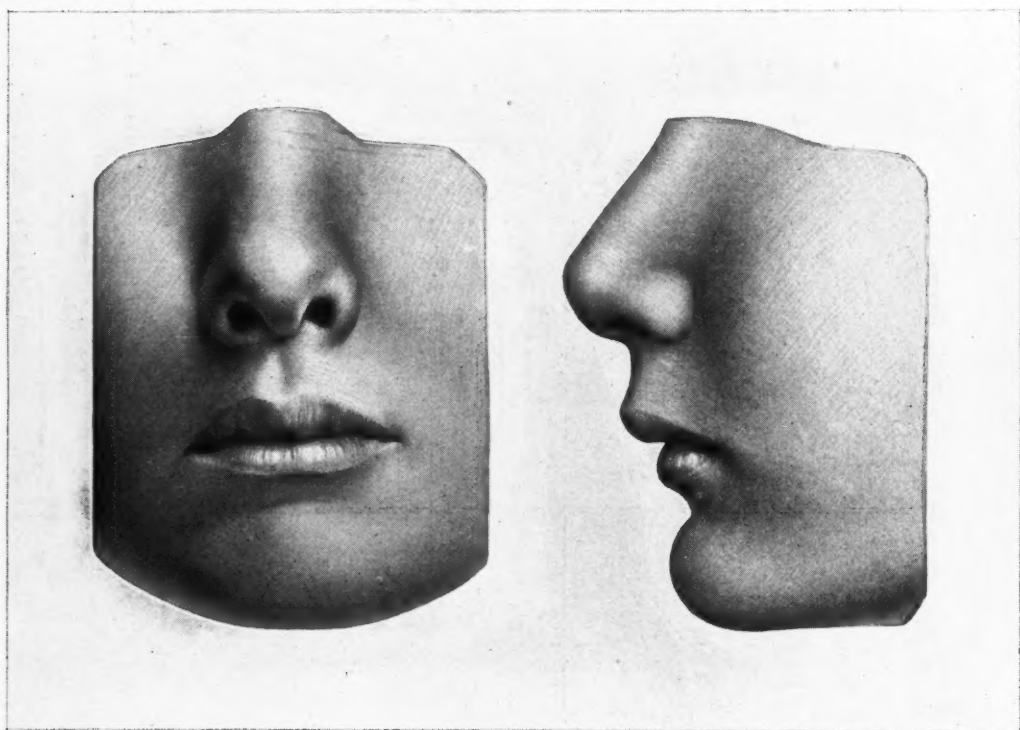


Fig. 16.—Shows malrelation of the lower lip to the upper, and abnormal mentolabial sulcus, due to distal relation of the lower arch; male 14 years old.



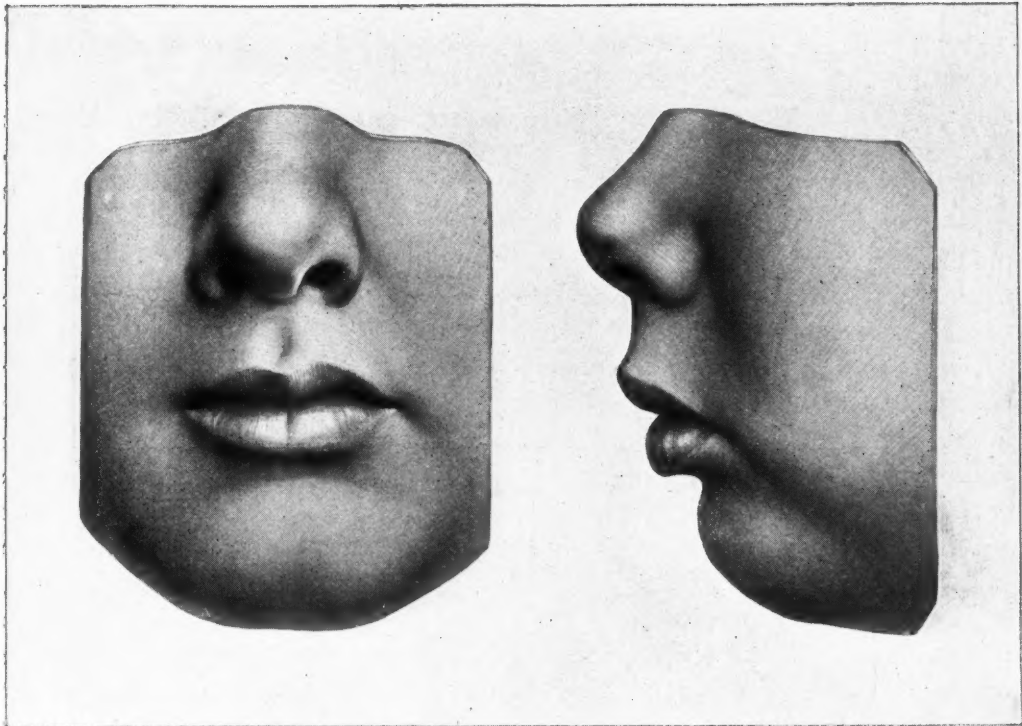


Fig. 17.—Deformity due to malposition of the mandible; the distoclusion of the lower arch is merely a symptom; male 11 years old. Compare the chin with that of Fig. 16.

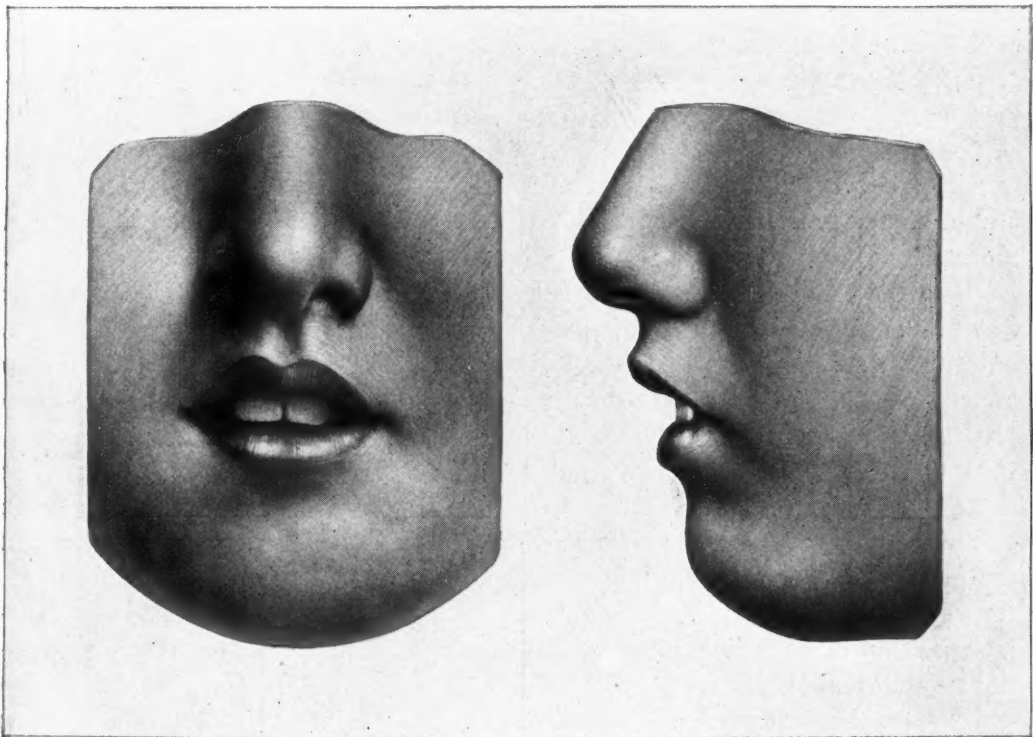


Fig. 18.—Shows malformation of the lips; note especially the extreme deficiency of the upper lip; female 13 years old.

are decidedly abnormal. This is due to a distal, or posterior, *malposition of the entire lower dental arch on its osseous base*, i.e., the mandible or lower jaw.

Deformities belonging to this group also vary considerably, passing by almost imperceptible gradations into that extreme type of facial malformation wherein the ascending rami of the mandible are too short, resulting in a posterior *malposition of the mandible* (Fig. 17). Such deviations will be considered in detail in subsequent chapters. For the present, the writer merely wishes to emphasize the normal function of the lips in this type, though it is combined with malrelation of the lips, a decidedly abnormal mentolabial sulcus and extreme deficiency of the mentum, or chin.

Fig. 18 presents still another type of deformity where, besides abnormal function, we have a marked *malformation of the lips*. Note the extreme deficiency in the length of the upper lip, due, in all probability, to prolonged abnormal function. Such extreme arrest of development is quite common, and if treatment is postponed beyond the developmental period its correction is exceedingly doubtful, if not impossible. The alert diagnostician is ever vigilant and strives constantly to prevent postponement in such cases.

A more comprehensive analysis of the various facial deformities due to abnormalities of dentition, emphasizes the necessity of a thorough understanding of the *anomalies of dentition*. It becomes desirable, therefore, to give an outline of them before proceeding to a critical study of their *pathology, facial types and prognosis*.

#### V. ABNORMAL DENTITION

The denture of man is a complex mechanism composed of many parts. Unfortunately, it frequently presents abnormalities and malformations which seriously affect the efficiency of the teeth, as well as the harmony of facial expression, the functions of breathing, and of articulate speech. Anomalies of form, of number and of eruption of the teeth are quite common, and complications due to abnormalities of the nasal tract and accessory sinuses, anomalies of the temporo-mandibular articulation, maldevelopment of the tongue and general facial musculature are not infrequent.

But there are *four fundamental deviations from normality* which conjoin in a wide variety of ways in malocclusions of the teeth, so that most writers now recognize their basic significance. These four conditions are: *malposition of the teeth, malrelation of the dental arches, malformations of the jaws and their processes, and malposition of the mandible*.

In describing the normal variations of dentition the writer called attention to the normal variations of alinement of the teeth (Broca). This arrangement of the teeth in the form of two parabolic curves within the alveolar processes of the jaws is called *alinement*. When a tooth deviates from the ideal line of its respective arch it is said to be in *malposition, or malalinement* (Fig. 19). Normal position of each individual tooth is a very fundamental property; it conditions its normal function.

When the lower teeth of an individual are brought into normal contact with the upper, it will be found that the inclined planes of their occluding cusps adjust themselves very accurately. This ideal relationship between antagonists



Fig. 19.—From casts of two upper dental arches showing alinement and malalignment.

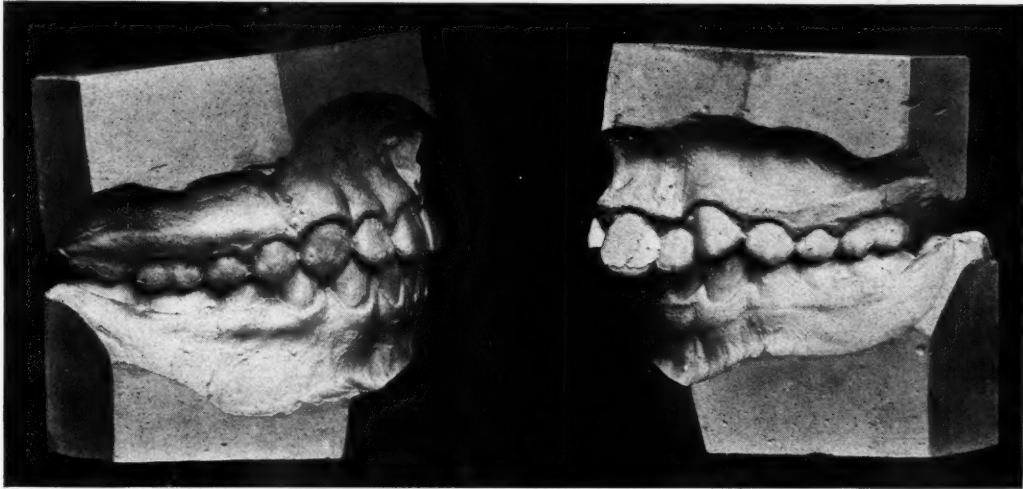


Fig. 20.—Occlusion and malocclusion, buccal aspect.

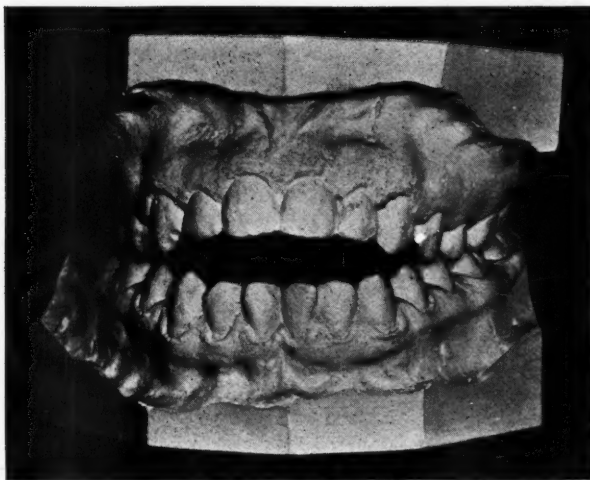


Fig. 21.—Nonocclusion, front view.



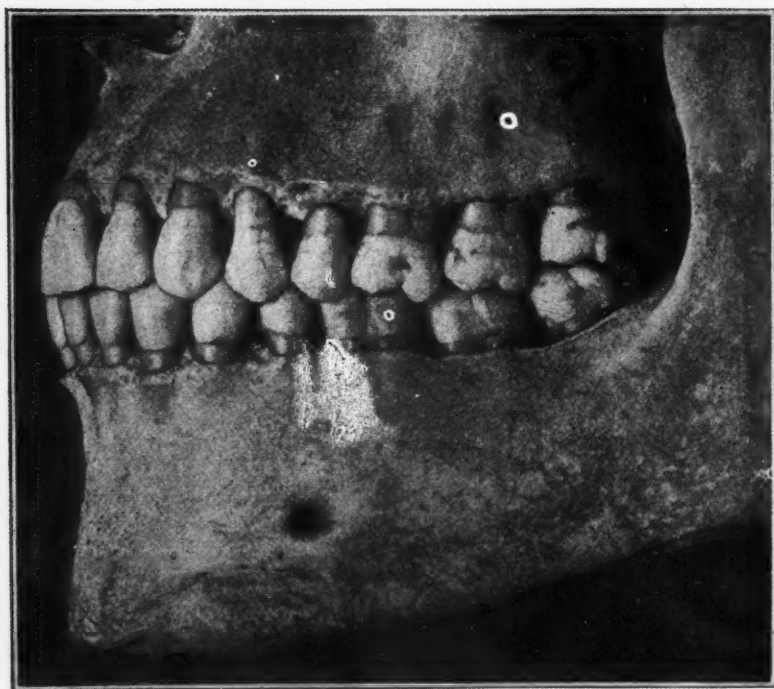


Fig. 22.—Occlusion of the permanent teeth of man, buccal aspect. (After Turner.)

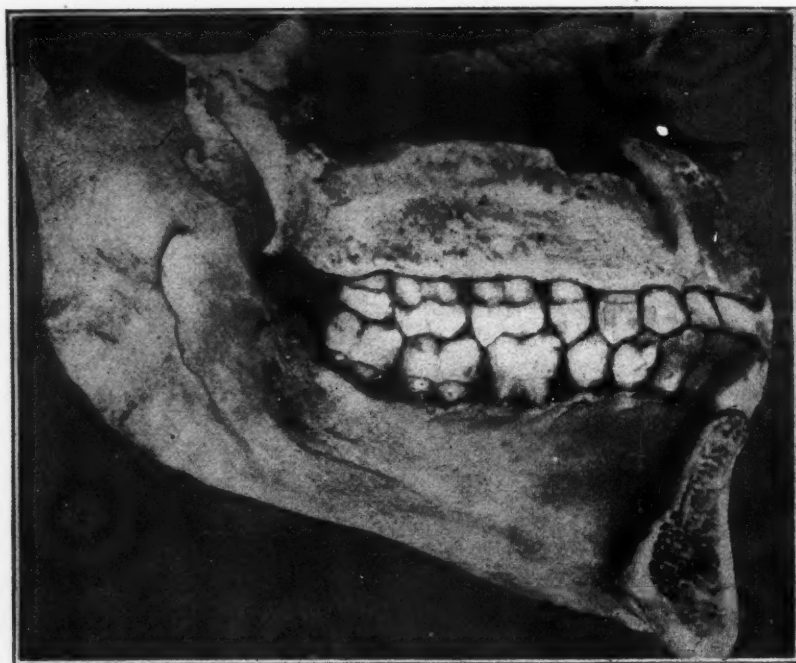


Fig. 23.—Occlusion of the permanent teeth of man, lingual aspect. (After Turner.)

is termed *occlusion*. When a tooth is in malposition and hence, on closure, comes into abnormal contact with antagonists, we term it *malocclusion* (Fig. 20).

Occasionally, teeth are in such extreme malposition that, on closure, they fail to come into contact. We term this *nonocclusion* (Fig. 21). There are ten primary forms of malposition of the teeth and a multitude of possible combinations. The ten primary forms are as follows:

*Labioversion*—when an anterior tooth is labial to normal.

*Linguoversion*—when a tooth is lingual to normal.

*Buccoversion*—when a posterior tooth is buccal to normal.

*Mesioversion*—when a tooth is mesial to normal.

*Distoversion*—when a tooth is distal to normal.

*Torsoversion*—when a tooth is rotated.

*Supraversion*—when a tooth erupts beyond the plane of occlusion.

*Infraversion*—when a tooth fails to reach the occlusal plane.

*Transversion*—when two or more teeth are transposed.

*Perversion*—when a tooth is impacted and cannot erupt.

The various combinations of these ten primary forms of malposition are best expressed by combining the appropriate prefixes with the ending *version*, e.g., *torso- mesio- infraversion*, etc.

The harmonious arrangement of the teeth in the form of two arcades or graceful curves (an upper and lower, each with its right and left sides), demands a fine adjustment of the individual members of each arch if a symmetrical, well balanced ensemble is to be established. But when the teeth of man assume the normal, the resultant denture exhibits a symmetry that is truly wonderful (Figs. 22 and 23).

Bearing in mind that we are here dealing with *bilateral symmetry*, we can readily understand how all of the upper teeth, or all of the lower, could be in more or less perfect alignment in their respective arches, and yet, on closure, fail to come into normal occlusion. In other words, either arch (even though it retain a normal form) may be so displaced in its entirety upon its osseous base, that normal contact with antagonists is impossible. Figs. 24 and 25 are diagrammatic of such deviations. When the lower arch is mesial in its relation to the upper on both sides, and neither jaw is sufficiently malformed to warrant special designation, we term it a *bilateral mesiocclusion*. If it is in mesial malrelation on one side only, we term it a *unilateral mesiocclusion*. When the lower arch is distal in its relation to the upper on both sides, and neither jaw is sufficiently malformed to warrant special mention, we term it a *bilateral distocclusion*. If it is in distal malrelation on one side only, we term it a *unilateral distocclusion*.

The bony structures of the jaws beyond the teeth are at times so malformed that the malocclusions of the superimposed teeth are purely symptomatic of the deformity. In fact, *malformations of the jaws* are the most serious conditions we have to deal with; at times we meet with such extreme deformity that its correction lies outside the domain of orthodontics. I contend that when a case presents a pronounced malformation of one or both jaws, it is the very

acme of unreasonableness to ignore it. And our terminology should be such that the spoken word would convey to the mind of the listener a fairly adequate idea of the conditions under consideration.

Now it is obvious that malformations of the jaws may express themselves in several ways, i.e., as overdevelopments, or as arrests of development. Hence the term *macrognathia* and *micrognathia*. Clefts of the palate and curvature of

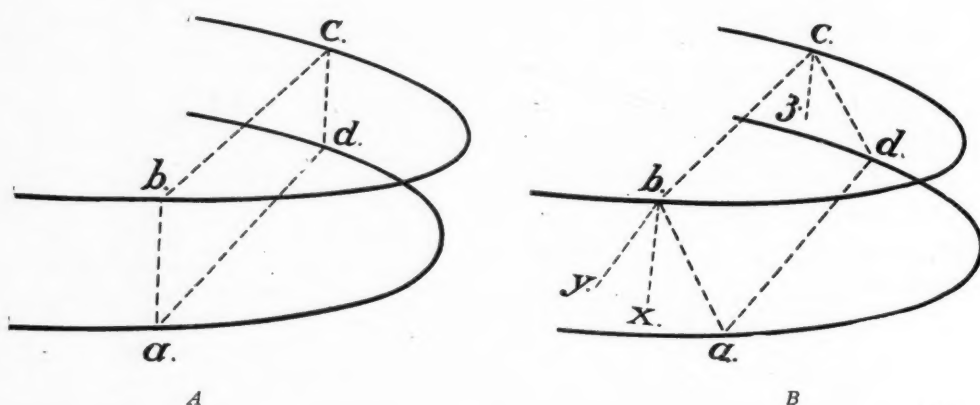


Fig. 24.—Diagram A illustrates normal arch relationship. In Diagram B, the parallelogram *a, b, c, d*, illustrates arch malrelation in bilateral mesiocclusion, and *b, y*, their relation in bilateral distocclusion.

the mandible are occasionally met with. Arrest of development in the rami of the mandible, and abnormal variations in its articular fossæ (which are not stereotyped or unchangeable), may cause *malpositions of the mandible* (Federspiel).

Fortunately, in a large percentage of cases, these more serious deviations from normality are entirely absent, or they are in the early stages of develop-

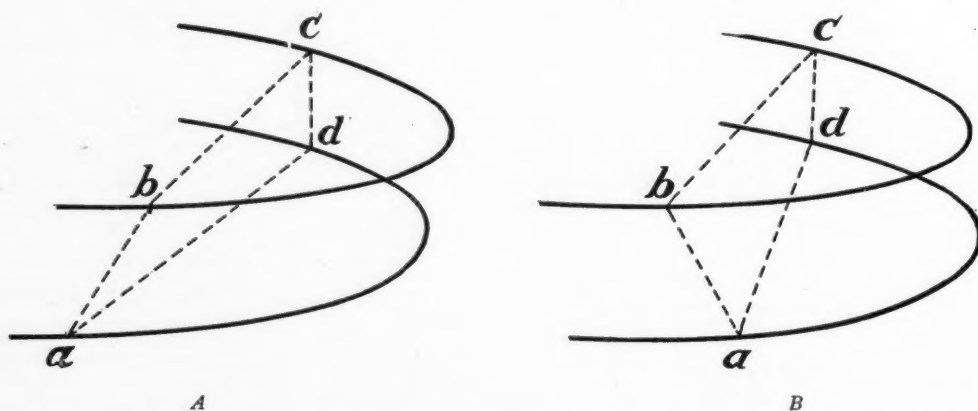


Fig. 25.—Diagrams illustrating arch malrelations in unilateral distocclusion and unilateral mesiocclusion.

ment and still amenable to treatment. But the following outline of dento-facial deformities is based upon the pathological manifestations briefly described above. For a more comprehensive argument in its favor the reader is referred to the writer's article on "The Classification of Dento-Facial Deformities" (*Interna-*



*tional Journal of Orthodontia*—Vol. 1, No. 6) and to the subsequent chapters in this series.

#### OUTLINE OF DENTO-FACIAL DEFORMITIES

*Neutroclusion*.—Simple and Complex.

*Distocclusion*.—Bilateral and Unilateral.

*Mesiocclusion*.—Bilateral and Unilateral.

*Maxillary Malformations*.—Macrognathia, Micrognathia, Clefts of the palate.

*Mandibular Malformations*.—Macrognathia, Micrognathia, Curvature of the body.

*Mandibular Malpositions*.—Retroversion, Anteversion.

*Tumors of the Maxillae*.—Fibroma, Carcinoma, Sarcoma, etc.

*Mandibular Ankylosis*.

*Polygnathia*.

*Agnathia*.

(To be continued)

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### COMPROMISE TREATMENT, OR CONSERVATIVE ORTHODONTIA\*

BY A. C. GIFFORD, D.D.S., OSHKOSH, WIS.

AFTER looking over articles published in the journals and books by eminent authors, and thinking of different subjects suitable for this paper, I could find nothing that treated upon what I have designated "Compromise Treatment." We find writings quite frequently upon types of cases upon which I use my so-called compromise, but they are all to be treated by a method that I do not always favor. Especially in those cases among our younger patients.

We read about moving the teeth back to their proper position, or back to where they should be normally, but nothing about bringing the teeth into approximal contact when a tooth is missing, which may be either congenital, or acquired by extraction.

When thinking of our teachings, we can think of only those cases coming under general plans of treatment, but, as we practice our chosen specialty, we find that there is a class of cases that can often be more properly treated in a more conservative manner. I find there are different conditions in different localities, especially as there are a great many general practitioners who do not seem to observe or know the orthodontic principles.

Where I advocate "Compromise Treatment, or Conservative Orthodontia" is in such cases as come under our care with missing teeth, and when patients apply to us for treatment during the growth of the bones of the face and jaws.

I do not think that all cases with missing teeth should be treated by the

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\*Read before the Sixth Annual Meeting of the Alumni Society of the Dewey School of Orthodontia, Kansas City, Mo., February, 1916.

compromise method for we must discriminate, especially so with patients past the age of bone growth.

When we find a tooth missing from a younger patient, be it either from congenital or an acquired cause, it is for us to use, not what I will call regular treatment, but what I have called "Compromise Treatment," and render our little patient what I think the most practical and proper dental apparatus.

In working out this form of treatment, you will come to certain conclusions that can be gotten only through practical work.

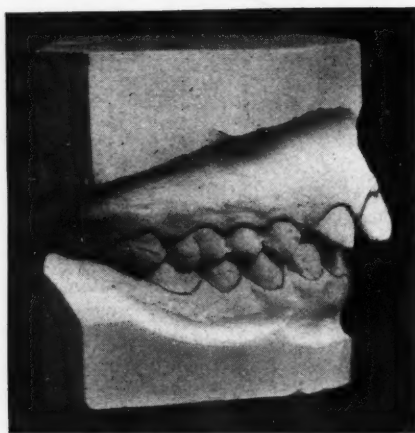


Fig. 1.—Right upper lateral incisor congenitally missing.

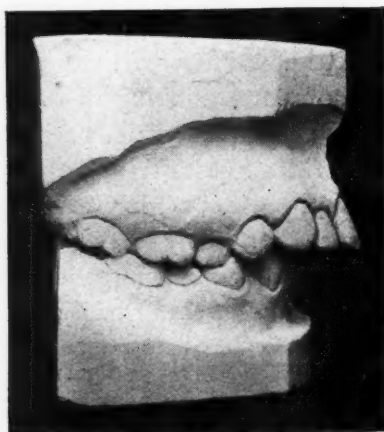
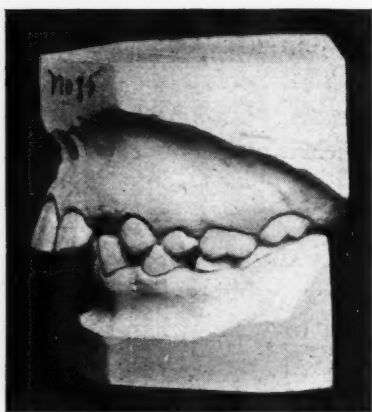


Fig. 2.—Right and left lower first molars missing, having been extracted.

Perhaps you can recall some case you have in your practice that has a tooth missing, it having been extracted, most always a first molar, and the other teeth have moved or tipped to find contact leaving very little space.

In my estimation it would not be a wise orthodontic procedure to try and regain that space and put in, or have put in, some artificial substitute to take the place of that missing tooth, thereby mutilating the teeth on either side of the space by mounting them with crowns or inlays for the purpose of placing a bridge, which, to my estimation can be nothing but unsanitary.

In the case of a molar, which is missing, you may say that a second molar

will not occlude properly with its antagonist, a first molar. This I will admit, but will it not occlude as well, and a great many times better than would some artificial molar? A second molar properly placed in the position that the first molar should occupy will make almost as good and serviceable a tooth as would the first molar and when the third molar erupts, it will take the place formerly occupied by the second molar, and be of some service.

As to the teeth which are missing from congenital causes, we will find

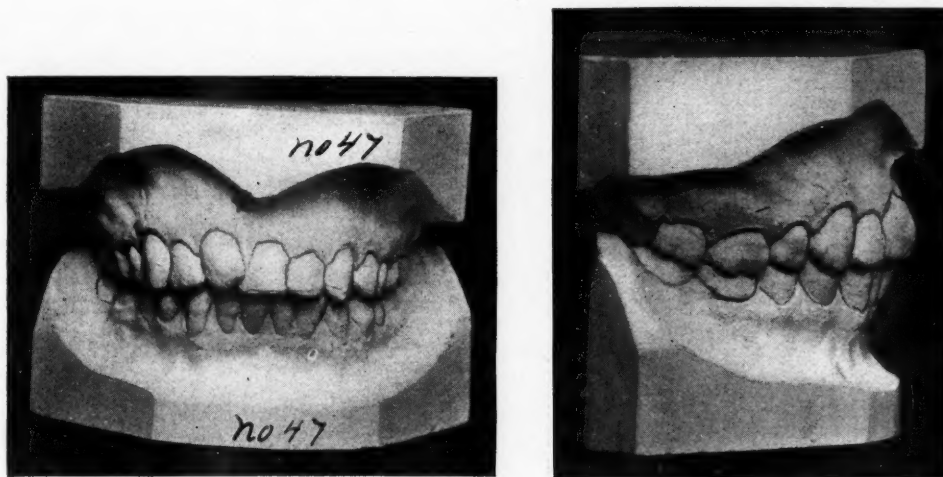


Fig. 3.—Front and side view, showing right upper first premolar congenitally missing.

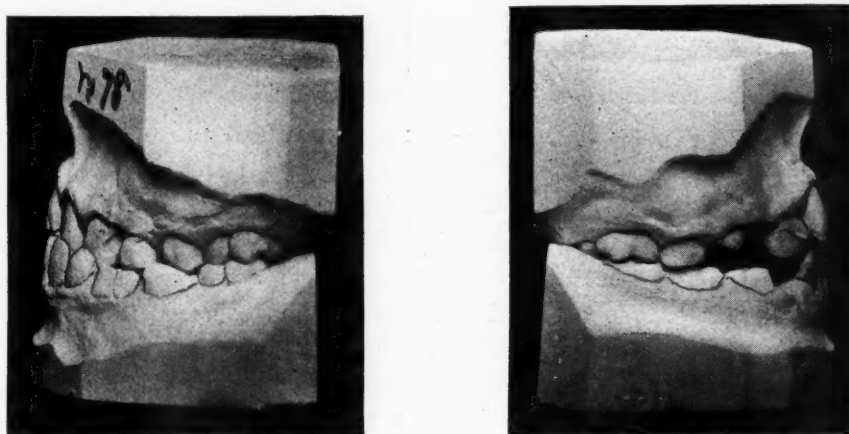


Fig. 4.—Right and left upper first premolars congenitally missing.

them to be mostly superior laterals, but, occasionally they may be premolars. When we find malocclusion associated with missing teeth, my plan is not to open the space that the missing teeth should occupy and make spaces for an artificial substitute, but to put the teeth into contact even though we do have to have a canine approximate a central, and have one side of the upper posterior teeth bite one cusp mesial to the normal. Would this not be a great deal less conspicuous than a porcelain tooth?

In order that I may demonstrate this a little more fully I have some illus-



trations that I will show you and explain my plan of treatment in this class of cases. However, I am sorry that at this time I cannot show you the finished results, but perhaps I can at some later date.

Now, if you will notice, the model shown in Fig. 1 has a right lateral missing, and the x-ray showed no tooth in the maxillary. Instead of moving the right lateral half to have the premolars bite normally, I left them as they were, and only moved the anterior teeth into contact. I believe that I am giving this young lady a better masticating apparatus than if I had made the space for the missing lateral, and had some conspicuous porcelain tooth inserted, and I have not mutilated the canine and central.

In Fig. 2 you will see that there are two lower first molars missing, having been extracted. The second molars have moved until they are almost in contact. This patient being but fourteen, I decided to move the second molars forward with the rest of the lower teeth, and when I am finished I expect to

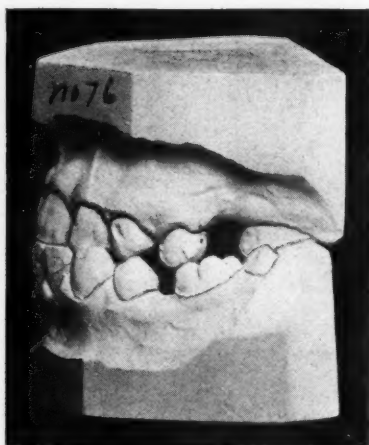


Fig. 5.—Left upper first molar missing, having been extracted.

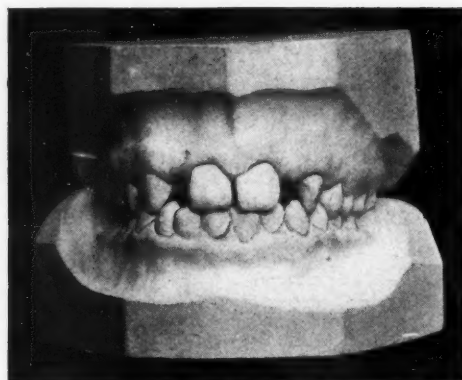


Fig. 6.—Both upper laterals congenitally missing.

have them in the position that the first molars would have occupied, or to take the place of the first molar in a normal position.

Fig. 3 shows a right first premolar missing from congenital causes, as there is no history of one ever being extracted, and the x-ray shows no tooth impact. This case is a very peculiar one, and I have tried to classify it, and the best I can do is to call it a Class I Angle. In treating this particular case, I had the left third molar extracted, and moved all the upper teeth on the left side (from central to second molar) distal to make the median line normal. I then took out an impact supernumerary tooth, shown at (X), and am now moving all the right upper teeth mesial without opening up the space in the first premolar region. I believe I will have a better appearing case when I am finished than if I had made a space for a premolar, and the tooth on either side will not be mutilated.

In Fig. 4 both of the upper first premolars are missing. There is no history of any extraction, and the x-ray did not show the teeth in the process. You will notice that the first molars are in their normal positions with the other teeth all in lingual occlusion. I believe the best way of treating this case is to move

the molars forward, so they will bite one cusp mesial to normal, and in this way take up the space of missing teeth. By so doing I will have the teeth all in contact, and will have no space to insert an artificial premolar. In my estimation, I have treated this case conservatively, and for the best welfare of the boy.

In Fig. 5 the first upper molar has been extracted. When I first saw this case, the roots of the tooth were present. Why should this space be retained when it is an easy matter to move the second molar into contact with the second premolar? I have moved this tooth into contact, but, as you see, this case needed considerable other work. I cannot show how nice a first molar this second molar makes.

The next and last case (Fig. 6) has two laterals missing. This case was referred to me to make some appliance to retain the space until this boy, now thirteen, was considered old enough to place a bridge to supply the missing tooth.

I came to the conclusion that this was a case where I could apply my compromise treatment, and I put this before the dentist who referred the case to me, with the result that I am now moving all the upper teeth forward just one cusp, or just enough so that the first premolar will be placed where the canine should normally be, and there will be no space left between the canine and central. Do you not think that I am doing what this boy should have? To wait until the boy was at least twenty years of age would have been necessary before the artificial laterals should have been placed and then those canines and centrals would have been mutilated.

I will say in closing that my paper might have been titled "Compromise Treatment vs. Artificial Substitution."

We find a great many cases of this class in our practice and I hope I have impressed you favorably with what I have surnamed "Compromise Treatment, or Conservative Orthodontia."

## MODEL LIBRARY INDEX

BY R. C. WILLETT, D.M.D., PEORIA, ILLINOIS.

VALUABLE statistics may be kept in the orthodontist's library if a little time is given to careful recording of a few numbers and dates as new models are made and placed in the Model Library Cabinet.

The writer has compiled a convenient index making practical use of Dr. B. E. Lischer's classification of Dento-Facial Deformities. To those who have made a careful study of Dr. Lischer's classification, it will readily be seen that it is the most complete that has been contributed to the science.

The loose leaf binder known as the DeLuxe price book No. 208 is used as an index book. The yellow, heavy bound index leaves are supplied with red leather margin tabs on which are stamped in gold letters the following abbreviations for the general divisions of the classification:

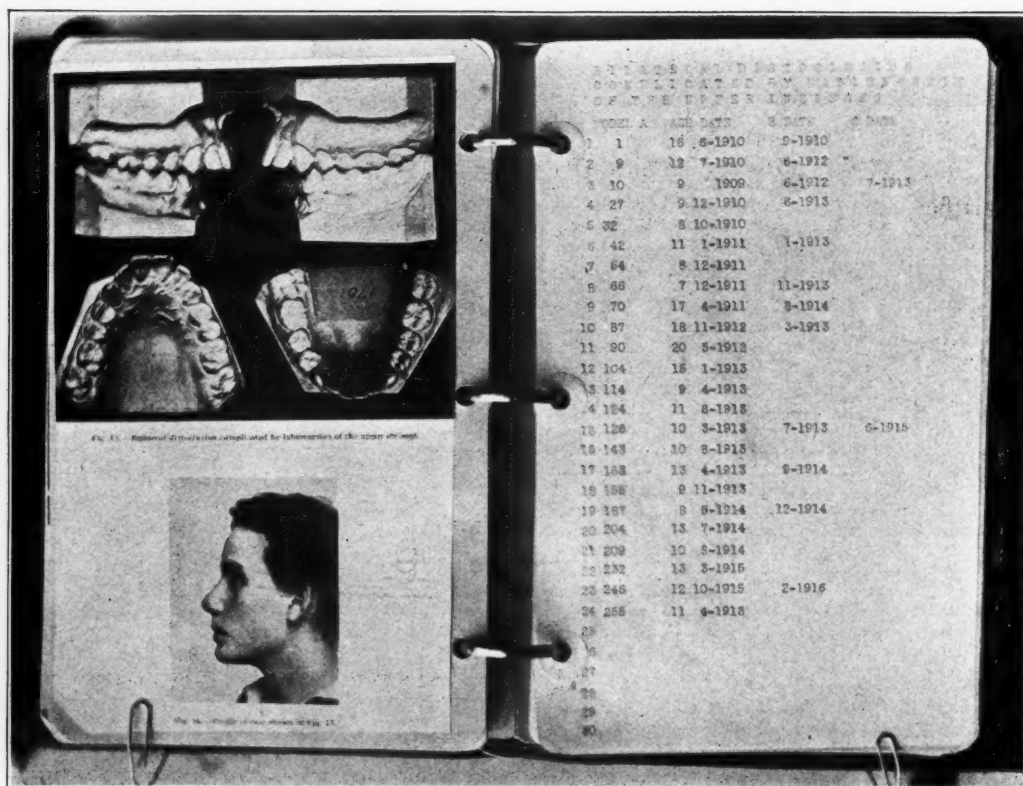
Neutroclusion	Neutro.
Bilateral Distoclusion	Bilat. Disto.
Unilateral Distoclusion	Unilat. Disto.
Bilateral Mesioclusion	Bilat. Mesio.

Unilateral Mesioclusion  
Abnormal Labium Frenum  
Malformation of the Jaws  
Miscellaneous

Unilat. Mesio-  
Ab. Fre. Lab.  
Mal. of Jaws.  
Misc.

The general divisions of the classification as given is then divided into such subdivisions as the orthodontist may consider essential to differential classification of dento-facial deformities.

The accompanying illustration shows the Model Index open. On the left side is an illustration of a typical case coming under that particular division. The page on the right shows in the first column the line number which readily gives the number of cases of that type entered for consultation or treatment.



Photograph showing model library index open.

The second column gives the filing cabinet number. The third, double column, gives the ages and dates of entry and the other columns show a date of additional model records as made.

The advantage of such an index as here described and illustrated is that an invaluable record of cases and differential diagnoses you have made is always at hand for ready reference and right up to the minute.

Only a brief outline of this index is given and that only in a general way, there being many essentials which will naturally suggest themselves to the experienced orthodontist.



## THE HISTORY OF ORTHODONTIA

(Continued from page 117.)

BY BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY

**JOHN HUNTER** (1728-93), a famous physiologist and professor of surgery, initiated in England a new epoch of dental art, and through his scientific observations was able to change the old ideas and put dentistry on a scientific basis. Having been a surgeon-general in the English army, he devoted most of his time to the anatomical and physiological aspect of the science and later to the treatment of dental diseases. In his writings, the first scientific work on the subject, Hunter gave a very long and detailed description of all parts constituting the oral cavity and masticatory apparatus. He tried to establish a scientific nomenclature of the teeth; the words *cuspidati* and *bicuspidati* were originated by him. He was the first to dwell at length on the occlusion of the teeth. In one of his works is a drawing showing the front and side view of the teeth in

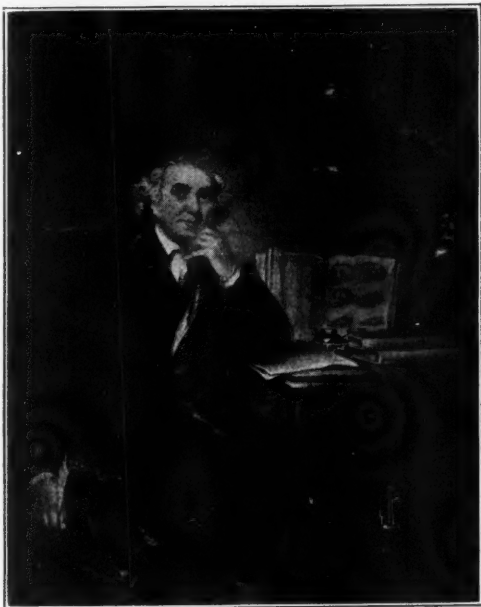


Fig. 1.—John Hunter (1728-93).

perfect occlusion (Fig. 2), and another showing the roots of the teeth exposed in their sockets (Fig. 3). It shows the relation of the upper and lower teeth, their overlapping and interlocking of cusps.

In speaking of the correction of dental irregularities in his work, "*Natural History of the Teeth*" (1771), he devotes three chapters to regulation of the teeth.

### CHAPTER VI

*Irregularities of the teeth.*—As that part of each jaw, which holds the ten fore-teeth, is exactly of the same size when it contains those of the first set, as when it contains those

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of the second; and as these last often occupy a much larger space than the first, in such cases the second set are obliged to stand irregularly.

This happens much oftener in the upper jaw, than in the lower, because, the difference of the size of the two sets is much greater in that jaw.

This irregularity is observed almost solely in the incisors and cuspidati; for they are the only teeth which are larger than their predecessors.

It most frequently happens to the cuspidati, because they are often formed later than the bicuspidi; in consequence of which, the whole space is taken up before they make their appearance: in such cases they are obliged to shoot forward or outwards over the second incisor. However, it frequently happens to the incisors, but seldom to such a degree. This arises often from the temporary cuspidatus of one or both sides standing firm. I have seen the irregularities so much as to appear like a double row.

The bicuspidati generally have sufficient room to grow, because even more space, than what they can occupy, is kept for them by the temporary grinders. This, however, is not



Fig. 2.— Hunter's conception of occlusion.

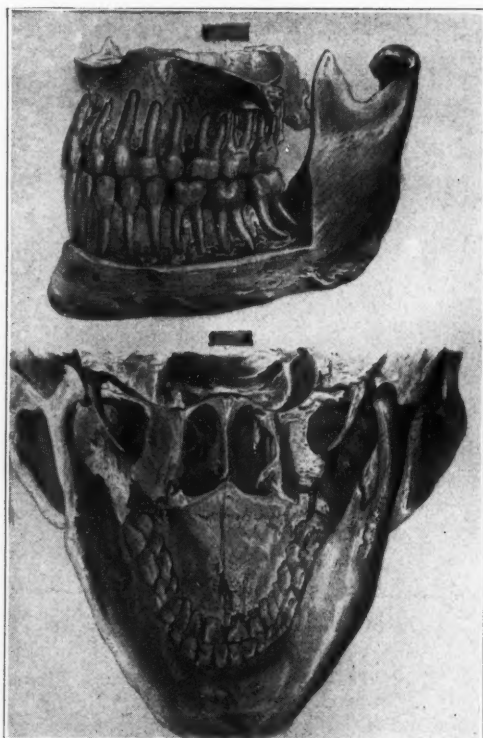


Fig. 3.—Teeth in occlusion, showing roots exposed and lingual view.

universally the case; for I have seen where the bicuspidati were obliged to grow out of the circle, very probably from their being later in growing than common.

That it is from want of room in the jaw, and not from any effect that the first set produce upon them is evident; first, because in all cases of irregularity we find that there is really not room in the jaw to allow of placing all the teeth properly in the circle, or that some are necessarily on the outside of the circle, others within it, while others are turned with their edges obliquely as it were, warped; and secondly, because the bicuspidi are not out of the circle, although they are as much influenced by the first set as any of the others.

As they are not influenced by the first set, it cannot be of any service to draw the first possessor; for that gives way in the same proportion as the other advances. As the succeeding tooth however is broader, it often interferes with a shedding tooth next to it, the fang of which not being influenced by the growth of its own succeeding tooth, it does not decay in proportion as the other advances, and therefore the drawing of the adjoining shedding tooth is often of service.

In cases of considerable irregularity for want of room, a principal object is to re-

move those which are most out of their place, and thereby procure room for the others which are to be brought into the circle.

To extract an irregular tooth would answer but little purpose, if no alteration could be made in the situation of the rest; but we find that the very principle upon which teeth are made to grow irregularly is capable, if properly directed, of bringing them even again. This principle is the power which many parts (especially bones) have of moving out of the way of mechanical pressure.

The irregularity of the teeth is at first owing to mechanical pressure; for one tooth getting the start of another, and fixing firmly in its place, becomes a resistance to the young, loose, forming tooth, and gives it an oblique direction. The same principle takes place in a completely formed tooth, whenever a pressure is made upon it. Probably a tooth might by slow degrees be moved to any part of the mouth, for I have seen the cuspidati pressed into the place of the incisors. However it is observed that the teeth are easier moved backwards than forwards, and when moved back that they are permanent, but often when moved forwards, that they are very apt to recede.

The best time for moving the teeth is in youth, while the jaws have an adapting disposition; for, after a certain time, they do not readily suit themselves to the irregularity of the teeth. This we see plainly to be the case, when we compare the loss of a tooth at the age of fifteen years, and at that of thirty or forty. In the first case we find, that the two neighboring teeth approach one another, in every part alike, till they close; but in the second, the distance in the jaw, between the two neighboring teeth, remains the same, while the bodies will in a small degree incline to one another from want of lateral support.

And this circumstance of the bodies of the teeth yielding to pressure upon their base, shows that, even in the adult, they might be brought nearer to one another by art properly applied.

*Cause of pain in dentition.*—These twenty teeth, in cutting the gum, give pain, and produce many other symptoms which often prove fatal to children in dentition. It has been generally supposed that these symptoms arise from the tooth's pressing upon the inside of the gum, and working its way mechanically; but the following observations seem to be nearer the truth.

The teeth, when they begin to press against the gum, irritate it, and commonly give pain. The gums are then affected with heat, swelling, redness, and the other symptoms of inflammation. The gum is not cut through by simple or mechanical pressure, but the irritation and consequent inflammation produces a thinning, or wasting of the gum at this part: for it often happens that when an extraneous, or a dead substance, is contained in the body, that it produces a destruction of the part between it, and that part of the skin which is nearest it, and seldom of the other parts, excepting those between it and the surface of a cavity opening externally, and that by no means so frequently.

As the operation of moving the teeth is by lateral pressure upon their bodies, these bodies must first have passed through the gum sufficiently for a hold to be taken.

The best time seems to be, when the two grinders of the child have been shed; for at this time a natural alteration is taking place in that part of the jaw.

The means of making this pressure I shall only slightly describe, as they will greatly vary according to circumstances, so considerably indeed, that scarcely two cases are to be treated alike, and in general the dentists are tolerably well acquainted with the methods.

In general it is done with ligatures of plates of silver. The ligatures answer best when it is only required to bring two teeth closer together, which are pretty much in the circle. The trouble attending this is but trifling, as it is only that of having them tied once a week or fortnight.

Where teeth, growing out of the circle, are to be brought into it, curved silver plates, of a proper construction, must be used. These are generally made to act on three points, two fixed points on the standing teeth, and the third on the tooth which is to be moved. That part of the plate, which rests on the two standing teeth, must be of a sufficient length for that purpose, while the curved part is short, and goes on the opposite side of the tooth to be moved. Its effect depends very much on the attention of the patient, who must frequently press hard upon it with the teeth of the opposite jaw; so that this method is much more troublesome to the patient than the ligature.

It is impossible to give absolute directions what tooth or teeth ought to be pulled out. That must be left to the judgment of the operator; but the following general hints may be of service:



1. If there is any one tooth very much out of the row, and all the others regular, that tooth may be removed, and the two neighboring ones brought closer together.

2. If there are two or more teeth of the same side very irregular (as for instance, the second incisor and cuspidatus) and it appears to be of no consequence, with respect to regularity, which of them is removed, I should recommend the extraction of the farthest back of the two, viz., the cuspidatus; because, if there should be any space, not filled up, when the other is brought into the row, it will not be so readily seen.

3. If the above mentioned two teeth are not in the circle, but still not far out of it, and yet there is not room for both; in such a case I would recommend the extraction of the first bicuspidati, although it should be perfectly in the row, because the two others will then be easily brought into the circle; and, if there is any space left, it will be so far back as not to be at all observable.

The upper jaw is often rather too narrow from side to side, near the anterior part which supports the fore-teeth, and projects forwards considerably over the lower, giving the appearance of the rabbit-mouth, although the teeth be quite regular in the circle of the jaw.

In such a case it is necessary to draw a bicuspidati of each side, by which means the forepart of the circle will fall back; and if a cross bar was to be stretched from side to side across the roof of the mouth, between cuspid and cuspid, it would widen the circle. These fore teeth might also be tied to this bar, which would be a means of assisting nature in bringing them back. This has been practiced, but it is troublesome.

As neither the bodies nor the fangs of teeth are perfectly round, we find that this circumstance often becomes a cause of their taking a twist; for, while growing, they may press with one edge only on the completely formed tooth; by which means they will be turned a little upon their center.

The alteration of these is more difficult than of the former, for it is, in general, impossible to apply, so long and constantly as is necessary for such an operation, any pressure that has the power of turning the tooth upon its center. However, in the incisors, it may be done by the same powers which produce the lateral motion; but where these cannot be applied, as is frequently the case, the tooth may be either pulled out entirely, and put in again even, or it may be twisted round sufficiently to bring it into a proper position, as has been often practiced.

#### CHAPTER VII

*Irregularities between the teeth and jaw.*—Certain disproportions between the teeth and jaw sometimes occur, one of which is when the body of the lower jaw is not of sufficient length for all the teeth. In such cases, the last grinder never gets perfectly from under the coronoide process, its anterior edge only being uncovered; and the gum which still in part lies upon the tooth, is rubbed against the sharp points of the tooth, and is often squeezed between the tooth upon which it lies, and the corresponding one of the upper jaw. This occasions so much uneasiness to the patient, that it becomes necessary to relieve the gum, if possible, by dividing it freely in several places that it may shrink and leave this surface of the tooth wholly uncovered. If this does not answer, which is sometimes the case, it is advisable to draw the tooth.

Sometimes, although but seldom, an inconvenience arises from the dentes sapientiae being in the upper jaw, and not in the lower; these teeth pressing upon the anterior part of the root of the coronoide process, when the mouth is shut; for the coronoide processes are farther forwards in such cases, than when the lower jaw also has its dentes sapientiae; in short, the exact correspondence between the two jaws is not kept up. In such cases I know of no other remedy, but the extraction of the tooth.

*Supernumerary teeth.*—When there are supernumerary teeth, it will, in general, be proper to have them drawn; for they are commonly either troublesome, or disfigure the mouth.

#### CHAPTER VIII

*Of the under jaw.*—It is not uncommon to find the lower jaw projecting too far forwards, so that its fore-teeth pass before those of the upper jaw, when the mouth is shut; which is attended with inconvenience, and disfigures the face.

This deformity can be greatly mended in young people. The teeth in the lower jaw can be gradually pushed back in those, whose teeth are not close, while those in the upper can be gently brought forward; which is by much the easier operation.



These two effects are produced by the same mechanical powers. While this position of the jaw is only in a small degree, so that the edges of the teeth can be by the patient brought behind those of the upper, it is in his own power to increase this, till the whole be complete; that is, till the grinders meet; and it is not necessary to go farther. This is done by frequently bringing the lower jaw as far back as he can, and then squeezing the teeth as close together as possible.

But when it is not in the person's power to bring the lower jaw so far back, as to allow the edges of its fore teeth to come behind those of the upper, artificial means are necessary.

The best of these means is an instrument of silver, with a socket or groove shaped to the fore-teeth of the lower jaw to receive them, so as to become fast to them (Fig. 4) and sloped off as it rises to its upper edge, so as to rise behind the fore-teeth in the upper jaw in such a manner, that, upon shutting the mouth, the teeth of the upper jaw may catch the anterior part of the standing surface, and be pushed forward with the power of the inclined plane. The patient, who wears such an instrument, must frequently shut his mouth with this view.

These need not be continued longer than till the edges of the lower teeth can be got behind those of the upper; for it is then within the power of the patient, as in the first stated case.



Fig. 4.—Appliance of Hunter to correct irregularities of the teeth.

**Auzebi** (1771), a dentist in Lyons, published a treatise on odontology, which is only remarkable for certain strange ideas that he expresses therein, the entire book being in complete contradiction with the great progress already realized at that period, in dental science.

To facilitate dentition he recommends among other things rubbing the gums with rough, hard and angular bodies. He also maintains, as does Brunner, that the milk teeth have no roots, contradicting in this respect, the opinion of Fauchard, Bunon and Bourdet, who decidedly affirm that the deciduous teeth are furnished with roots, precisely the same as the permanent ones. According to Auzebi, when it so happens that the milk teeth have roots, they are not shed.

**Robert Wooffendale**, the first to practice dentistry in America, in his "*Observations of Human Teeth*," published in 1783, devoted some little time to the correction of irregularities. Being a pupil of Thomas Berdmore, he continued along the lines of his preceptor. In October, 1766, Mr. John Wooffendale arrived in the United States from England. This gentleman was the first regularly educated dentist of whom any record can be found as having visited this country.

Mr. Wooffendale commenced practice in New York soon after he arrived, later practicing in Philadelphia. In March, 1768, either because he did not receive sufficient practical encouragement in his profession, or from some other and unexplained cause, he returned to England.

The first recorded set of teeth inserted in America (an entire double set of artificial teeth) for Mr. William Walton, of New York, was constructed while he was there. From the time when Mr. Wooffendale returned to England until some years after the Declaration of Independence there was not, as far as can be discovered, a regularly practicing dentist in this country.

It is interesting to note just what the condition and the knowledge of malocclusion was at that time.

"If proper attention was paid to the removal of the first set of teeth, the just symmetry and proportion of the second might be preserved, and consequently every inconvenience and defect arising from irregularity of the teeth would be avoided. . . . When the teeth come irregular and have been neglected for some time, they frequently may be reduced into proper order with safety. This operation often takes some months if the teeth are much out of their places, the younger the patient the better when this operation is to be performed. There is a method of performing it very expeditiously, by twisting the teeth into their places by means of a pair of strong pliers. This method is practiced by some; but it may not be improper to observe that the patient is liable to have the bony socket split, or the teeth broken or forced out in the operation, yet allowing none of these accidents to happen, they often remain loose and troublesome ever after."

When the coming of the canines is much delayed, and there is a prospect of their irregular presentation, he says: "It is sometimes (though not always) advisable to take out either the first double, or the second single teeth, to give room for the progress of the eye teeth."

*Observations of the teeth from six to twelve years old.*—Of taking out the shedding, or first teeth.

The advantage of taking out the first teeth, at proper times, will be very considerable, as it will prevent the second set coming crooked, which they are subject to do; some projecting forwards; some inclining inwards; others riding one over the other, altogether, or in part; some twisted half round, presenting the side edge where the front ought to be, which gives a very awkward appearance; but which are not the only inconveniences; for, by coming in the above mentioned crooked direction, they cannot be kept clean, consequently are more liable to decay; and, for want of that regularity in the teeth, so pleasing to the sight, the mouth is frequently crooked, and the shape of the face much altered. By introducing the finger under the lip of a person whose teeth grow in an irregular order, it may be observed that the irregularity continues nearly to the extremity of the root of such teeth. This observation proves, that the bony socket is altered by irregular teeth, and we find in skeletons, that the shape of the bony socket is uneven, when the teeth are irregular.

Persons whose teeth grow in this disagreeable manner are desirous of hiding the deformity from view as much as possible with the lips, by which means they generally acquire an ungraceful habit of drawing the mouth on one side; and sometimes of endeavoring to draw the upper and the under lip, so as to conceal as much as possible all the teeth in the mouth; which has a formal and unpleasant effect, and prevents that freedom and ease in the conversation which they would enjoy if freed from such restraint. Even, regular teeth, are one of the greatest ornaments of "the human face divine"—give an elegance and expression to the countenance—and contribute, in an essential manner, to the beauty and regularity of the face; as, without such aid, the harmony of the most perfect set of features would be incomplete.

This is an operation I never performed in this mode; and at present I am of the opinion I never shall; it bespeaks a want of humanity, honor, or professional knowledge in the dentist who performs it in such a manner; as methods much more safe, easy, and efficacious may be practiced.

With all the circumspection and art a dentist can use in the removal of the first set of teeth, he cannot (as far as my observations have informed me) at all times be certain that the eye-teeth will come in their proper places, when they do not appear sooner than the age of fourteen, sixteen or eighteen years.

*Of being under-jawed.*—This is a circumstance often seen and which produces a disagreeable effect when it takes place; it is occasioned by the front teeth of the under jaw projecting before the front teeth of the upper jaw. There are very few cases of this kind (I believe not one in a hundred) that might not be remedied or prevented by the dentist,

allowing he has the teeth from six to fourteen years of age. When circumstances of this nature are neglected in early life, the under jaw becomes considerably lengthened during its growth; and the front teeth in both jaws are generally rendered useless in mastication.

I have not found the under jaw to project before the upper one in children, while they had their first teeth only.

When persons are under-jawed, and intend having them reduced, they should first reconcile themselves to submit to such a process as will be necessary to perfect the cure; which is often attended with little pain, and the operation is completed in a week or fortnight; although it will sometimes require some months to perfect it.

When this operation is to be performed, the younger the patient is the better.

It is impossible to give directions for reducing the under jaw when it projects before the upper one, as it is rare to see two cases circumstanced exactly alike.

I have seen some persons whose under jaws have been too broad for the upper ones (but not too long); those parts of the large double teeth in the under jaw which should be opposed to the grinding surface of those in the upper jaw coming in contact, in mastication (or when the teeth in each jaw touch) with that side of the large double teeth in the under jaw that should lay against the cheek; causing the double teeth in the upper jaw to occupy too small a space for those of the under jaw.

There are some persons whose upper and under front teeth never touch each other; therefore are of no use in mastication. The inconvenience may sometimes be remedied; but, as in the two immediately preceding cases, the method of procedure will be so variable, according to circumstances, that it is not in my power to lay any given rule to proceed by.

I have met with some few instances of the teeth in the front of the upper jaw occupying too large a space for the teeth in the front of the under jaw. This inconvenience may generally be relieved, by reducing the number of teeth in the upper jaw; and, sometimes, without extracting any teeth.

The reasons for the use of the file given by Wooffendale are as follows: "The teeth are filed on various accounts, viz., to remove broken or jagged points which happen either from accident or decay and are liable to injure the tongue; to stop the progress of a beginning or advancing caries; to round off edges of the teeth, though not decayed or broken, that grow irregular and prove troublesome to the cheek or tongue; lastly, for ornament." He adds, "Some universally condemn filing teeth; on the other hand, some are for having all teeth filed—I apprehend some teeth cannot be filed without being injured by it; others cannot be saved by any other method."

Crude as were the above ideas regarding the use of this instrument, they were universally held at the date of Wooffendale's writing. The removal of "broken or jagged points," and the rounding off of edges of the teeth that grow irregular and prove troublesome to the cheeks or tongue, are ideas descended direct from Celsus.

**Robert Blake** (1793) in his *Inaugural Dissertation* published in 1798, takes issue with Hunter in regard to the causes of irregularities of the teeth and the results saying: "In the fetus three or four months old, the rudiments of the teeth are placed nearly regular, but as they increase more rapidly than the arch, the jaws, we find some of them at birth, as it were, pressed out of the circle for want of room, particularly the cuspidati; so that the sockets of the lateral incisors and those of the anterior grinders nearly come in contact. However, the jaws gradually accommodate themselves to the teeth, and increase at this part nearly in proportion to the size of the cuspidati, becoming again regular, for, indeed, we seldom or ever meet the temporary teeth irregular. This Mr. Hunter allows, but says (*Natural History of the Teeth*), 'The jaw still increases in all



points till twelve months after birth, when the bodies of the six teeth are pretty well formed; but it never after increases in length between the symphysis and the sixth tooth; and from this time, too, the alveolar process, which makes the anterior part of the arches of both jaws, never becomes a section of a larger circle; and after this time the jaws lengthen only at their posterior ends.' Mr. Hunter supposed, as the temporary grinders are larger than the bicuspidi which succeed them, that the difference in size of these would be sufficient to allow the permanent incisors and cuspidati, which are much larger than their predecessors, to become regular, without any increase of the arch or circle. He was led into this opinion by comparing four lower jaws of different subjects, and at different periods of life, from the age when the five temporary teeth are completed, to that of an entire permanent set. He acknowledges, however, that it is impossible there should be a mathematical exactness in four different jaws, nor, indeed, is there a mathematical exactness in the lines drawn to support his theory, for they are by no means parallel.

"Indeed, so varied are the dimensions of the jaws, that the arch of one year old may correspond or even exceed the arch of the adult and *vice versa*, the arch of an adult may be nearly as large again as that of the child, so it is not by comparing different jaws together that we shall be enabled to draw proper conclusions; but by comparing the permanent and temporary teeth of the same jaw.

"It appears from my preparations, and experience convinces men, that the space occupied by the temporary teeth would not be sufficient to accommodate the same number of permanent teeth which succeed them, and which, on the whole, are so much larger, particularly in the upper jaw. This fact, Mr. Hunter was aware of, and mentions that irregularities are more frequently met with in the upper than in the under jaw; so far I agree with him.

"We have seen the rudiments of the permanent teeth at first placed nearly regular, but as ossification advances on them, they become crowded together for want of room. This irregularity particularly happens to the permanent teeth, because they are the first situated at the internal part of the jaw, and, of course, in a much smaller circle than the temporary. In the under jaw, the lateral permanent incisors hide nearly half of the middle ones, and the lateral incisors and anterior bicuspidi are so close together, that the cuspidati would not have room enough to pass up between them. In the upper jaw there is a much more confused appearance, and a more striking contrast with respect to the difference in size of both sets of teeth, the lateral incisors rest in part on the middle ones, and the sockets of the lateral incisors and the anterior bicuspidi nearly come in contact; so that the cuspidati are entirely thrown out of the circle. We have seen also that the pulps and membranes of the permanent teeth were first very small and that the sockets were in proportion; but as the pulps enlarged and ossification advanced on them, the sockets increased likewise. It is but just, therefore, to suppose that the teeth rise and appear through the gum, and alveolar processes should accommodate themselves to them; which, indeed, will presently appear to be the case. If Mr. Hunter was a practitioner in this branch, even with very little experience he must have frequently observed in children of about six or seven years old (if the first teeth had not already fallen), large distances



between the incisors, which at first were quite close to one another. I have seen hundreds of instances in which the four permanent incisors appear irregular but in a short space of time became perfectly regular without any artificial assistance. In a preparation of Dr. Munro's (which he was kind enough to allow me to take a sketch of) the four permanent incisors of the under jaw had appeared, and also the middle incisors of the upper, and were perfectly regular, though the temporary cuspidati and grinders had remained, in the former, and the lateral incisors, cuspidati and grinders in the latter. Surely, then, these teeth could have gained no room from the difference in size of the grinders and bicuspids; it must, therefore, be owing to an increase in the arches of the jaws in these parts exactly in proportion to the difference in size of the temporary and permanent incisors. There is still in this case further necessity for considerable increase of the arches, on account of the irregular situation of the permanent teeth as well as because several of them had not as yet arrived at their full size."

"From what is now said I feel myself justifiable in concluding that the alveolar arches continue to increase during the entire progress of the formation of the teeth; it is, however, sufficiently evident that the greatest increase of the jaws is backwards. I do not by any means deny but that we frequently meet with disproportions between the jaws and teeth, and in such that the permanent teeth never would become regular without the assistance of art, even in young persons; this may arise from the resistance of the temporary teeth, or from teeth forming so much out of the circle that they have not sufficient power to act on their neighbors and press them back, such as the cuspidati, which are most commonly irregular. Indeed, if Mr. Hunter's hypothesis were true, we would never see a regular set of teeth."

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## THE IDEAL AGE FOR THE CORRECTION OF MALOCCLUSION\*

BY W. W. MARTIN, D.D.S., KANSAS CITY, MO.

THE question is usually asked by the general practitioner, and also arises in the mind of the specialist, as to what is the exact age, or the ideal age, for the treatment of malocclusion. The advice that was generally given several years ago by the majority of men in the dental profession who were consulted in regard to the treatment of malocclusion was to allow the case to wait awhile, as the irregularity might correct itself. Experience has proven that waiting is of no avail so far as correcting the malocclusion of the permanent teeth is concerned, and, in fact, there is no evidence to substantiate the claim that malocclusion of the deciduous teeth ever improves as the result of the patient waiting. It must, however, be evident to those who have observed a number of cases of malocclusion, either in their own practice or in the practice of others, that there must be an ideal time at which certain types of malocclusion can be advantageously treated; that there must be a period in the development of malocclusion at which desired results can be obtained in the shortest possible time, and when the least trouble will be experienced in the process of retention. It is a well known fact, as stated by Lischer, that malocclusions are of slow development. The majority of them have a small beginning, and become more complicated as the individual becomes older and a larger number of teeth erupt. As a result of this condition, there has been developed during the last few years a new feature by some orthodontists, namely, preventive orthodontics, or preventive treatment. There is no question that preventive medical treatment has been of great benefit to the human race. There is also no question that prophylaxis in dentistry has played an important part in this amelioration, and any treatment that prevents complications of malocclusion is to be commended.

With these facts in mind, let us consider what may be accepted as the ideal age for receiving certain types of malocclusion. It has been established that certain malocclusions make their appearance in the deciduous teeth, and that marked benefits will be derived by treating those malocclusions. I refer particularly to distoclusion, Class II, and mesiocclusion, Class III. It is our belief that disto- and mesiocclusion, when present in the deciduous teeth, should be treated at as early an age as possible. The treatment of these mesio- and distocclusions in the deciduous arches will establish normal relation of the cusps, cause the proper action of the cusps during mastication, and produce the proper function of the muscles, and therefore create as nearly as possible a normal development of the mandible and the maxilla. If a case of distoclusion in the deciduous teeth is allowed to go uncorrected, there will follow a distoclusion in the permanent teeth, and such results will also occur in mesiocclusion. If, however, we correct the case of distoclusion in the deciduous arches, it is very probable, if nothing untoward arises, that the permanent teeth will occupy their proper posi-

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tions. It is also probable that, unless the patient becomes a mouth breather, or an etiological factor arises to again produce a distoclusion, the permanent teeth will occupy their normal mesiodistal relation. If we correct the case of distoclusion of the deciduous arches, and some etiological factor arises later in life to produce the same condition again, we could not expect the treatment of the deciduous arch to prevent the same etiological factor causing a malocclusion of the permanent arches. That is likewise true in the case of mesiocclusion. We might correct the mesiocclusion and get the teeth in proper relation, and later in life the patient might develop extremely large faucial tonsils about the time of the eruption of the first molars; he might develop a rachitic condition, resulting in a softening of the mandible. The result would be etiological factors causing mesiocclusion again, which would, in all likelihood, develop in the permanent teeth. These matters are mentioned as a caution against making a promise that the correction of malocclusion of the deciduous teeth will always be a preventive of malocclusion in the permanent teeth.

There have been cases where treatment of distoclusion in the deciduous arches has corrected the distoclusion, but neutroclusion developed in the permanent arches. As a result of such occurrence and of other conditions that have arisen, it has become a practice with some orthodontists to treat the deciduous arches for neutroclusion, or in other ways expand the deciduous arches to prevent malocclusion of the permanent teeth. It is a theory of some men, and unfortunately held by some men of international reputation, that, by the expansion of the deciduous arch, neutroclusion of the permanent teeth will be prevented even if there are no neutroclusions of the deciduous arches. In other words, this theory is equivalent to saying that the permanent arches will always be crowded or contracted, and that every child is doomed to have a malocclusion of the type of neutroclusion. This theory is that, as the permanent teeth are larger than the deciduous teeth, there is not sufficient room in the deciduous arch, and consequently, in the expansion of the deciduous dentures by moving the deciduous teeth labially and buccally, sufficient room will be created for the permanent teeth because this movement of the deciduous teeth stimulates and creates a growth. It is a well-known fact that, before the permanent teeth erupt and before the deciduous teeth are lost, if the child is developing normally, there will be spaces formed between the deciduous teeth. These spaces in a child who erupts a central incisor at the age of 6 begin to make their appearance at about the age of 5 years, or a little later. It is the practice of some men, when they see a deciduous arch is not spacing, to put on an appliance and expand those deciduous arches, even though the deciduous teeth are in perfect normal position. Now, all children do not develop with the same rapidity; spaces may not exist at 5, but would exist at  $5\frac{1}{2}$  years; a condition that would be perfectly normal in one child at 5 would not be normal for another at the same age. In other words, children do not develop with the same degree of rapidity according to the calendar. A child may be 6 years old according to the calendar, but, so far as dental development is concerned, it may be only 5. For these reasons, the ideal age of the child for the treatment, must be determined by the condition of the dental apparatus. It is our belief that a great many deciduous arches are expanded when a child is treated according to its age that should not have re-



ceived such treatment, and many children are consequently forced to wear regulating appliances at a time when they are not necessary. In such cases, the patient is being subjected to a line of treatment that almost borders on charlatan-ism.

There are, however, some types of neutroclusion in the deciduous teeth that should receive attention, and such types are labial and lingual relation of the upper or lower incisors. For instance, if we find an upper incisor or all of the upper incisors of the deciduous arch biting lingual to the lower incisors, the condition should be treated; and if we find a decided case of bunching or torsocclusion of the deciduous teeth, that condition should also be treated. I have never observed in my practice a case of extreme torsocclusion of the deciduous dentures, nor have I ever seen a model that shows such a condition. Occasionally we will find the lower central incisors slightly rotated, but they are rotated to such a small extent that treatment will not be advisable because, even though they are rotated, there is sufficient space in the arch to accommodate them in their normal condition. To correct the rotation would not increase the development of the dental arch, and, of course, it is not to be expected that correcting the rotation of a deciduous tooth will have any influence on the permanent tooth, as in the absorption of the root of the deciduous tooth the alveolar process is also absorbed with it, and therefore the correction of the rotation cannot possibly have any influence on the production or prevention of torsocclusion of the permanent tooth.

It is our opinion that the earliest age at which the treatment of neutroclusion of the deciduous teeth should be attempted with the idea of preventing further complications is at the time of the eruption of the permanent tooth. If the permanent central incisor is about to erupt, and there is not sufficient room between the deciduous laterals or the two incisors, so that the permanent centrals are in torsocclusion, or are erupting labially or lingually, then, and not until then, should the expansion of the deciduous arches be recommended. If the permanent central incisors are not prevented from getting into their proper positions, and even though there is no development between the deciduous canines and the centrals to accommodate the permanent laterals, it is better to wait until the permanent lateral begins to erupt; and if we see that it is taking a malposition, we can then begin to expand, for we will have ample time to expand the arch and tease the lateral incisor into its proper position before it erupts occlusally in the plane of occlusion. That will be sufficiently early for treatment, for it is a histological and anatomical fact that, even after the crown or cutting edge of the tooth has reached the plane of occlusion, the root of the tooth has not completely formed. If we succeed in getting a tooth in its proper position before the formation of the root, we will have gained all we need so far as physiological development of the tissue around the tooth and the root of the tooth is concerned.

In the treatment of the mesio- and distocclusion it must be remembered that the mesial and distal positions of the individual first molars are influenced by the proximal contact of the deciduous teeth. Very often we will have a loss of a deciduous molar, which will allow one of the permanent molars to drift forward mesially, and, of course, that drifting of the molar should be treated



at once, both with the idea of establishing a normal mesiodistal relation of the molars and making the proper space for the erupting premolars. If the deciduous teeth are in their positions, it must be borne in mind that, as the second premolar is wider mesiodistally than the upper deciduous molar, the lower first permanent molars will necessarily be held distal until the deciduous molars are lost. This must be remembered so as not to consider these conditions as one of distoclusion, because, if the deciduous teeth are lost in their proper order, the lower molar will seek its proper relation to the upper during the shedding of the deciduous teeth. We have seen several cases that were diagnosed and treated as distoclusion which were not distoclusion, but were normal conditions existing at that age of the individual. Of course, mesio- and distoclusion of the permanent teeth should be treated as soon as possible, for nothing is gained by waiting, as the complications will become worse. It was formerly argued that, owing to the nervous strain placed on the patient, the treatment of malocclusion should be delayed until the patient was older. That is entirely wrong, for, if the malocclusion is treated properly, there is not as much nervous strain placed upon the patient from wearing the appliance as there is on the general system as the result of malocclusion, which prohibits proper mastication and respiration.

We have considered only the ideal age for the treatment of malocclusion, but that condition can be treated much later in life than the age which we have mentioned. While malocclusion can be treated at 15 and 16 years of age and even later, it is not the ideal age at which to treat them, and advice should not be given which would allow patients to conclude that they can be treated as well at that age, for they cannot. Even though results can be obtained at the later age, they are acquired with much more difficulty.

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## CHANGING FROM GENERAL PRACTICE TO ORTHODONTIA —A FEW EFFORTS\*

BY H. B. HAMILTON, D.D.S., ITHACA, N. Y.

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THE orthodontist maintains that general dentistry and orthodontia cannot be practiced together without one or the other, or both, being slighted to a greater or a less degree.

There came a time in my practice when it became necessary to decide whether to continue attempting some of the cases presented among my patients, or to endeavor to become more proficient, and to give orthodontia a larger place in my work.

After spending the allotted time in the course of instruction, I returned home enthusiastic, and anxious to put my newly acquired knowledge to use, as well as to formulate plans to become an orthodontist in fact. But it is not easy to start a profitable orthodontic practice over night. Neither is it easy to cast off old patients in a general practice that has been years in the building. It was necessary to combine the two, giving the preference to the former, and

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making my living from the latter. This necessitated a new plan of conducting my practice. The appointment book, filled for weeks ahead, was no longer possible. Time must be available for orthodontia cases whenever they presented.

The first effort to limit my practice was the decision to take no new patients for any work outside of orthodontia.

The next rule was to make no appointments for general practice after 3:30 P. M., and on Saturdays. All of the remainder of the time was available for general work. Cases were few in the beginning, and much of this time was given to general dentistry.

It was also my endeavor to keep appointments from stringing out too far ahead. Patients asking for appointments were listed, together with the work required, and the most convenient times for the patient. The telephone was used, and appointments made only a short time in advance whenever the opportunity presented. This has worked out far more satisfactorily than anticipated.

These rules have not been easy to carry out. It is difficult to refuse new patients referred to us by old, but it is still harder to refuse members of the families already patients, and especially as in the case of a child just arriving at an age requiring work.

Another rule is to decline appointments to patients not seen in a long time. Patients will occasionally go several years without work and it is difficult to deny them, and particularly so when they have never been to another. But it is necessary to be firm.

All of these rules help to reduce the number of patients for general work, although not so rapidly as might be expected. In fact, at first it seems to stimulate business, for the mere announcement that you are specializing and limiting your practice brings in the old patients, who fear you will drop them, and the new ones who suddenly discover that you are the most desirable practitioner in town. Nevertheless, all of these things do cut down the general practice eventually provided they are rigidly carried out. Occasionally it is necessary to make exceptions, but as orthodontia cases increase, the exceptions are rare.

Nothing was said about the difficult patients, or those who are poor, or slow to pay. These we are always willing to eliminate, and now is the available time.

Another class that is easy to eliminate, are those always demanding immediate attention. If they are unwilling to wait until they can be cared for, but go elsewhere for the present work, they are no longer considered patients. This does not apply to those cases actually requiring attention at once.

All this time patients have been gradually impressed with the idea that orthodontia is my chief work, and takes precedence over everything else. They are being made to understand that probably some time in the future someone else must do their work, but at the same time informed that as long as I can care for them properly I shall be glad to do so.

The problem is not entirely solved, but these methods are helping. What the future demands, the future must supply.

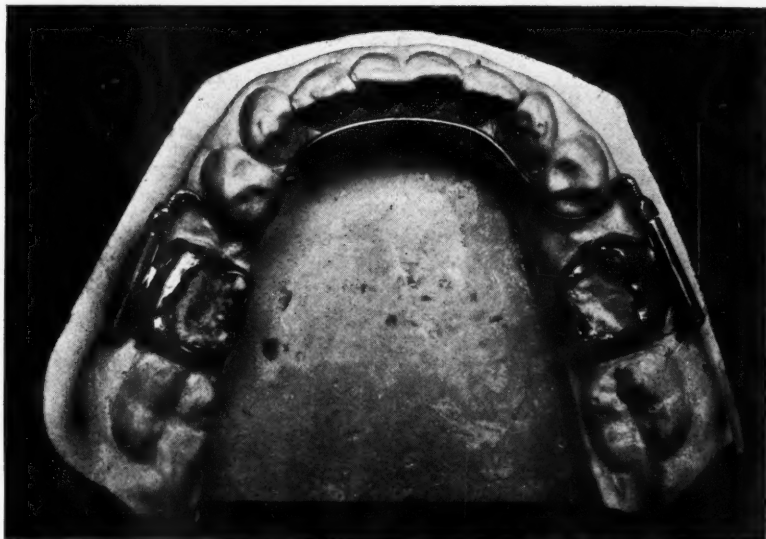
## AN APPLIANCE FOR OPENING UP SPACE FOR UNERUPTED BICUSPIDS

BY WALTER H. ELLIS, D.D.S., BUFFALO, N. Y.

THIS appliance, as illustrated, is a simple and effective device for opening up the space for unerupted or missing bicuspids, and occasionally for opening the space for a missing first molar, if the second molar is in place. It can be adjusted so that it will at the same time develop the entire arch.

It is, as far as I know, original, but I make no claims in that direction, because it is, as in many apparently new appliances or methods, but a new application or modification of older basic principles.

Its construction and application are well shown in the illustration. The molar bands, tubes, and threaded end sections are those usually used in other



forms of appliances. The lingual wire is .030 gold and platinum wire, bent to fit accurately the incisors, cuspids and bicuspids at the gingival line and the ends soldered to the threaded section.

This appliance can also be used in cases where the tooth is missing on one side only, by the following modification. It is made as in the illustration on the side where the tooth is missing, while on the other side the lingual wire is carried directly back to the mesiolingual surface of the molar where it is bent at right angles in such a way as to fit into a vertical tube, which is soldered to the molar band. It is best to use a lock spur as well, to prevent the slipping of the appliance. This vertical tube allows the lingual wire to turn sufficiently for the readjustment of the dental arch in its accommodation for the new space.

By turning the nuts gradually, the appliance will open the space with but very little attention or readjustment. It will also, with but slight simplification, act as a retainer. This appliance may be useful to the reader only to carry the case through an early period of treatment, this to be followed by an appliance for the bodily movement of teeth.

## CURRENT ORTHODONTIC LITERATURE

EDITED BY H. C. POLLOCK, D.D.S.

### A Further Study of Some Etiological Factors of Malocclusion

THERE has just come to our notice a very interesting paper (*Dental Cosmos*, February, 1916) on etiological factors of malocclusions read by Dr. Milo Hellman, of New York City, before the Eastern Association of Graduates of the Angle School of Orthodontia at its recent meeting in New York City. In order that the readers of this Journal may have a permanent record of this valuable contribution to orthodontic literature for their files, we have deemed it advisable to give this article in full. (Several illustrations that appeared in the original paper have been omitted.)

Despite the remarkable progress recently made in the mechanics employed in orthodontic therapeutics, the advancement of the knowledge pertaining to the causes of the disturbances thus treated is being rather neglected. So much time and thought is now being devoted to the perfection of the technical detail involved in the construction of the modern orthodontic appliances, that little seems to be available for a more thorough consideration of the underlying causes that find expression in the deformities known as malocclusion of the teeth.

It is rather paradoxical to think that the best minds in this specialty should seek the solution of a problem of such vast proportions by devising and multiplying the means for the treatment of various conditions without eliciting more strenuous efforts in the search for more exact knowledge of the causes that bring them about.

Medicine never reached a higher plane in the course of its development than in the recognition of the importance of prophylaxis. Prophylaxis, again, would never have been duly appreciated without a keen perception of the causes which bring about disease processes. It is, therefore, a self-evident truth that, if orthodontia is to gain a firm foothold within the domain of the art and science of healing, and be closely interwoven in the fabric of its allied branches, an earnest effort must be made for a more thorough investigation of the problems involved in the etiology of those deformities the correction of which are at present but empirically accomplished.

*Statistics on Breast-Feeding Versus Bottle-Feeding in Their Influences Upon the Development of Teeth.*—In the report published in the *Dental Cosmos*, September, 1914, p. 1017, the essayist outlined a method of procedure by which each and every individual interested in the progress of orthodontia should constitute a factor in its advancement. With this purpose in view, one thousand and fifty diagnostic charts were sent to the various specialists in orthodontia, with a reprint of the report, in order to obtain more data. So far only *five* charts have been received, properly filled out. This is the extent to which interest was shown and support given in the study of the problem on hand. Discouraged but little by the lack of interest thus far shown, the essayist proceeded to gather



his data, as heretofore, to study the material on hand, and to prepare a further report to this society. In order, however, to bring the new evidence into logical sequence with what has already been said, it will be necessary to reiterate some of the essential points dwelt upon a year ago.

(1) According to reliable statistics it was found in Berlin that the mortality of infants fed on cow's milk during the first year is six times greater than that of breast-fed infants. Furthermore, according to Dr. Thomas F. Harrington, from 80 to 90 per cent of all deaths from gastro-intestinal diseases among infants takes place in the artificially fed.

(2) Based upon an investigation of 2,400 cases, G. von Bunge found that 64 per cent of the women examined were decidedly unable to nurse their infants, and that this inability is on the increase.

(3) Upon the investigation of all chronic diseases that stand in close connection with the inability to nurse, Von Bunge discovered also that caries of the teeth is intimately related to it.

(4) Upon the investigation of the relationship between artificially fed infants and malocclusal conditions, it was found upon the examination of 84 cases of malocclusion that 81 per cent were partly or entirely bottle-fed.

The examination of 50 additional cases of malocclusion gave the following results: Breast-fed 6=12 per cent. Bottle-fed 12=24 per cent. Breast and bottle-fed 32=64 per cent.

This again shows that, while 12 per cent depended entirely on breast-feeding, 88 per cent had to resort to the bottle for sustenance. If this number be added to that of a year ago, the sum obtained would be 134, and would be classified as follows: Breast-fed 22=16 per cent. Bottle-fed 33=25 per cent. Breast-and-bottle-fed 79=59 per cent.

Combining those cases that had to resort to bottle feeding, we have 102=83 per cent, as compared with 81 per cent previously reported. It is evident, then, that with the increase in number of 50 additionally recorded cases, the percentage rises by two, although the reverse might be expected. The question arising now is: If it be granted that artificial feeding stands in close relationship with subsequent malocclusion of the teeth, what brings it about? Is it the presence of the bottle and the cow's milk that produces the pernicious effect? Or is it the absence of the breast and the normal mother's milk that creates conditions unfavorable for the perfection of the normal?

It has been maintained that "Although a disease or disturbance of any form represents the sum-total of a symptom complex, it may appear in any of its intermediate stages during the course of its development. Its recognition, therefore, depends upon the extent of knowledge related to the sequence of its progress." And "In order to gain the knowledge pertaining thereto, it is necessary to acquire an absolute mastery of all the probable factors that enter into the composition of such a symptom complex."<sup>1</sup>

If it be remembered that, in the life-cycle of the infant, the period of nursing is pregnant with a multitude of conditions, upon the records of which the future history of the dental apparatus will depend, it is quite plain that any change, alteration, or modification in the nature of the food, may produce a corresponding deviation from the normal in the functional activity of the mouth,

in the development of the incompleting dental organs, as well as in the health and growth of the entire individual. The manner in which artificial food is administered may also add its quota in this process. Furthermore, any aberration in the quality or quantity of the natural mother's milk may similarly represent a constitutional disturbance in the parent, the effects of which, as will be seen, probably have some influence upon the developing teeth of the offspring.

It will, therefore, be of logical significance to discuss our topic from the following points: I. What other processes stand in close relationship to those of the development of the teeth? II. What is the effect of the disturbances necessitating bottle-feeding upon the deciduous dentition? III. What testimony besides malocclusion does the permanent dentition bear of nutritional disturbances prevalent during the nursing period?

*I. What Other Processes Stand in Close Relationship to Those of the Development of the Teeth?*—Considerable prominence has been recently given in medical literature to the term "internal secretion." No work of any scientific value is now complete without a detailed account of the ductless glands. But popular as this gland apparatus has become in the scientific world, it is in no wise commensurate with the possibilities it has created for the interpretation of phenomena that have hitherto been inexplicable. Diseases whose causes and events were a book with seven seals, against which the medical world stood powerless, have been clearly interpreted by the aid of the science of "internal secretion;" cures have been effected in many instances, and the progress of disease has at least been interfered with in others. Also dentistry has been greatly benefited by this science. The study of pathological phenomena in tooth and jaw development has been guided into an entirely new path.

It is not intended to describe to any extent the intricacy of this most wonderful apparatus of glands, this being far beyond the scope of the present work. It may, however, not be out of place to touch upon the effects produced by these glands and to recommend the works of Biedl,<sup>2</sup> Cushing<sup>3</sup> and Kranz<sup>4</sup> for general as well as special information upon the subject of internal secretion. What is of interest in the present investigation is to find a clue to the manner in which the teeth and jaws are affected in some of the disturbances of these glands.

In a recent work on "Internal Secretion in Relation to Jaw Formation and Tooth Development," by Dr. P. Kranz, the author gives an adequate account of numerous investigations, including his own, of the various ways in which the teeth and jaws are affected by disturbances occurring in the ductless glands. The evidence adduced was obtained by the experimentation and clinical observation of such known authorities as have won recognition throughout the civilized world.

*Malocclusions and Cretinism.*—Thus, as early as during the middle of the last century, no less an authority than Virchow<sup>5</sup> described the malposition of the upper jaw after a careful study of the cretin-skull collection in Würzburg. Scholz,<sup>6</sup> in 1906, after a thorough description in his work on the changes in the cretin head, specially mentions that "The mouth is large, being surrounded by thick and swollen lips, and is constantly held open. The fleshy, thick tongue . . . is held motionless on the floor of the mouth, or hangs out of the open oral cavity." In 12 per cent of the cases examined he found faulty tooth formation,

while the dental arches were rarely regular. "Often," says he, "the teeth are out of alinement," assuming various forms of malposition. Also supernumerary teeth and missing dental germs are of no rare occurrence. According to Bayon, it is found that in those cretins who possess a good denture, a double tooth-row in the lower anterior region may be observed. The incisors are small, interspaced, and show vertical or horizontal ripples in the enamel covering of the crowns. The canines are seldom characteristic, being small and resembling the incisors. The wide lower jaw is shifted forward.

In the 56 cretin cases examined by Scholz, this investigator found 7 with protruding upper alveolar process and teeth, and 3 with protrusion of the lower. Eugene Bircher<sup>7</sup> also reports on numerous and varied occlusal anomalies observed in cretins. He found that, besides malposition of the teeth, also irreg-



Fig. 1.—Cretin skull, showing enamel deficits in the form of ripples. (After Kranz.)



Fig. 2.—Lower jaw of thirty-one-year-old cretin, showing presence of deciduous teeth with their permanent successors. (After Kranz.)

ularity in the shedding of the deciduous and eruption of the permanent series is prevalent.

P. Kranz, after extensive investigations of typical cretins in various institutions in Europe found on an average very poor dental conditions. "There was manifested the abnormal in both dental and jaw relationship, such as malpositions of the teeth, defects in their development, abnormal structures, and almost in every case high frequency of caries and enormous deposition of tartar." He observed three decided cases of Class III, but more often there appear conditions of underdevelopment and malpositions of the teeth of all sorts, from the simplest to the most complex. The teeth of most of the cretins presented structural defects in the form of longitudinal or horizontal ripples, the so-called "rickety" teeth. Fig. 1 shows horizontal ripples on all the teeth. The fifty skulls examined by the same author in the Pathologic Anatomical Institute at Gratz



simply verified his clinical findings. Fig. 1 represents a skull from the collection at this institute. Another rare case of anomalous development and malposition of the teeth is portrayed in Fig. 2, representing the lower jaw of a cretin of thirty-one years, in which the persistence of a number of deciduous teeth may be seen *in situ*, in conjunction with the permanent successors.

*Disturbances of the Thyroid Gland.*—The causative factor of cretinism is well established, and is known to be a diseased condition of the thyroid gland; it is until now the only known cardinal feature of all cretinoid conditions. It is never absent, and occurs typically at all ages, be it in the form of thyroid degeneration, strumous deterioration, or complete absence; or the thyroid gland may first hypertrophy and then gradually disappear.

As the etiology of this disturbance is quite clear, it was a simple matter to verify these findings by experimental evidence. Kranz, thereupon, thyroidec-tomized several pigs and rabbits in order to study the conditions produced. The rabbits showed retarded development and some ripples in the enamel covering of several teeth. The pigs, though failing to show any abnormalities in the de-



Fig. 3.—Skull of thyroidectomized pig, showing ripples on the teeth. (After Kranz.)



Fig. 4.—Showing effect of experimental thyroidectomy. A, Normal dog. B, Thyroidectomized dog. Both of same litter. (After Biedl.)

velopment of the dentition and in position of the teeth, showed considerable underdevelopment and marked ripples on the enamel of the teeth, closely resembling those of the cretinoid dentitions. Fig. 3 shows the head of a thyroidectomized pig, exhibiting the ripple effect on the molars.

Other experimental evidence may be gathered from Biedl, showing the difference in development of body and dentition between a normal and thyroidectomized dog of the same litter. (See Fig. 4.) Both these dogs are four months old; thyroidectomy was performed on the small specimen when three weeks old. Fig. 5 shows the difference in the heads and dentures of the dogs presented in Fig. 4.

*Disturbances of the Parathyroid.*—While the diseased condition of the thyroid gland gives rise to the general disturbance known as myxedema, the elimination of the parathyroid produces tetany. Both experimentation and clinical observation coincide with this. But besides tetany, the extirpation of the parathyroid in animals also produces loss of hair, shaggy furs, emaciation, cataract, and disturbances in the teeth, due to alterations in the calcific materials.

The investigations of Erdheim<sup>8</sup> on the influence of the parathyroid body



upon tetany brought to light the grave trophic modification in the rodent teeth of his parathyroidectomized rats. They showed defective calcification of the dentin, whereby the rodent teeth were so weakened that they eventually fractured. The changes in the enamel, again, consist in partial interruptions thereof, the appearance of enamel drops in the epithelium and formation of creases in the latter, with a typical enamel production at a distance from the tooth.

*Disturbances of the Thymus.*—The thymus gland has been variously studied, and while a unanimous conclusion as to its exact functional importance has not as yet been reached, it has been found to play an important role in the develop-

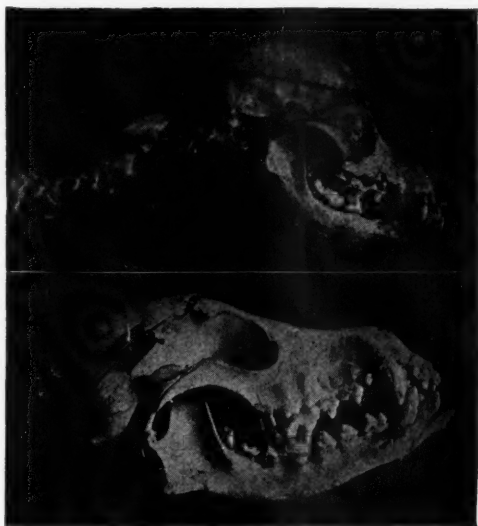
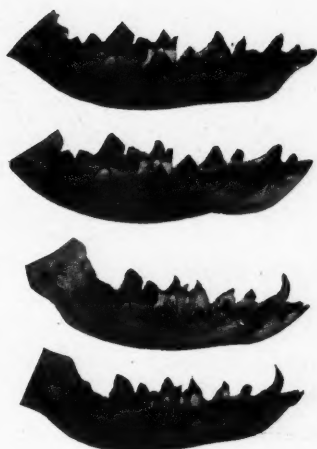


Fig. 5.—Skulls of dogs as in Fig. 4, showing difference in size of head, jaws, and teeth in thyroidectomized and in normal dog. (After Biedl.)



A



B

Fig. 6.—A, Skulls of thymectomized dogs, showing difference in size of jaws and teeth of larger (normal) and smaller (operated) animal. (After Biedl.) B, Radiographs of the lower jaws of animals as in A, showing effect of thymectomy on the jaws, teeth and dentition. (After Kranz.)

ment of the skeletal system. Thymectomy produces a specific thymectogenous bone condition. The skeletal system remains hypoplastic or dwarfed in its entire growth. The bones become atrophic, bendable or breakable, according to the stage of development. A similar cause may produce rhachitis or osteomalacia in the same animal. The cause seems to be the lack of insoluble calcium, which is decreased more than half in the bone system of thymectomized dogs. Fig. 6, A, represents the heads of two dogs of the same litter. According to Kranz,

they were born October 28, 1911. While the one was thymectomized on November 14, 1911, the other served as a control. The experimental dog died on April 9, 1912, and the control animal was killed April 18th of the same year. In the figure it will be noted how much larger the skull of the control animal is as compared with that of the operated dog. The teeth of the normal animal are also more massive. In the thymus dog there is an appreciable tardiness in the dentition. There are anteriorly all the deciduous incisors, while their successors are just approaching their eruption. In the control animal there are but two tiny remnants of the deciduous denture, while the permanent incisors are all present, they being larger and more powerfully developed than those in the thymus dog. In the thymectomized animal there may be seen the delicate deciduous canine, and the permanent successor can barely be observed in its course of eruption; while in the control animal it may be seen that alongside of the large deciduous canine the massive permanent tooth has already taken its position. Also in the premolar series may be observed that while the thymus dog still shows two deciduous teeth, the control animal has erupted the three per-

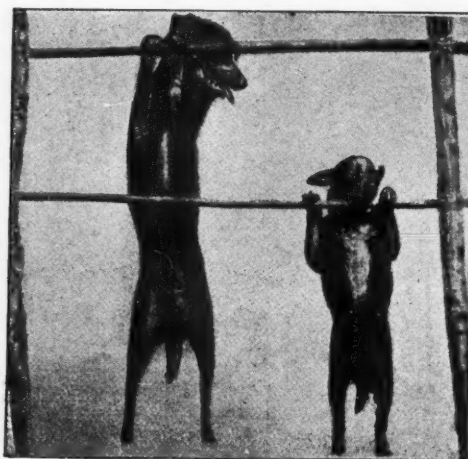


Fig. 7.—Showing difference in size of the control (larger) and experimental (smaller) dog. (After Ascoli.)

manent ones. The molars in the thymectomized dog are considerably smaller than in the control. These differences are more appreciable in the lower jaw. (See Fig. 6, B.) While the normal animal shows only one deciduous premolar with resorbing roots in conjunction with the permanent teeth, the thymus dog exhibits all the deciduous teeth with the exception of the recently erupted permanent incisors. This shows that the thymus has doubtless influenced the development of the teeth and jaws.

*Disturbances of the Pituitary Body.*—Disturbances in the pituitary body are also known to bring about certain modifications in the jaws and teeth, besides giving rise to certain general diseases. Thus, Fischer<sup>9</sup> maintains that acromegaly and splanchnomegaly are due to disease conditions of the anterior part of that body. Following the experimental removal of the hypophysis in the dog, such marked differences may be observed two months after the operation that it is impossible to believe that the control animal belongs to the same litter as the experimental one. (See Fig. 7.) The experimental dog becomes obese,

sluggish, and stupid as compared with the normal animal. The epiphysis in the experimental dog never reaches a stage of complete development. Referring to the sexual desires, it may be said that in the experimental animal they are reduced to a minimum. Gravity never takes place, and, if existing, it is interrupted by the removal of the pituitary body.

In regard to the dentition we may follow the observations of Legnani and Ascoli,<sup>10</sup> as well as those of Aschner:<sup>11</sup> "While the change in dentitions in the normal animal is completed regularly from the fourth to the fifth month, there is a persistence of the deciduous dentition in the experimental dog up to the 12th or 13th month—according to Aschner even throughout life. Aschner observed in small operated animals by the end of the first year the persistence of the deciduous dentition and the eruption of certain permanent teeth (incisors and canines), so that a double tooth-row existed, all the deciduous teeth being perfectly firm."

Figs. 8, A and B, by Ascoli, illustrate the difference in size, in head formation, and in the dentitions of the two dogs. There may be observed that in the experimental animal there are, in addition to the deciduous teeth, also some

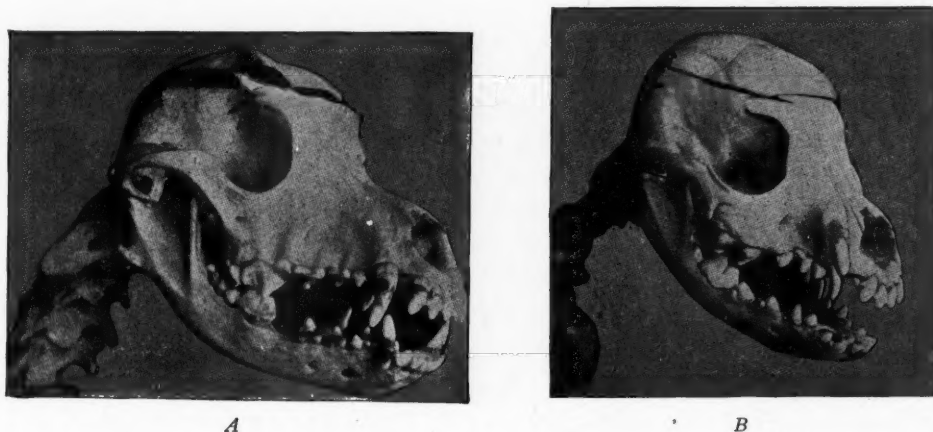


Fig. 8.—Skulls of dogs as in Fig. 7, showing difference in size of jaws, teeth, and dentition. (After Ascoli.)

permanent ones; the latter are more delicate than and differ in form from those in the normal dog of the same age (sixteen months). These differences are more clearly shown in the lower jaws of the dogs. In this connection it may be mentioned that an increase in functional activity of the pituitary body produces acromegaly, with symptoms similar to those described in the experimental dogs. The case of Pehr Gadd, reported a year ago,<sup>12</sup> may be recalled, where there was an extreme enlargement of the lower jaw-bone, due to a tumor in the hypophysis.

*Disturbances in the Sexual Glands.*—The sexual glands also have been declared by several investigators (Dupuytren, Meckel and Gruber) to produce certain changes in the bone formation of the entire skull, especially in the jaw-bones. Thus in castrates the lower jaw will develop to an enormous extent, as will also several of the other bones of the head.

The close relationship existing between the function of the ductless glands

and the formation of jaws and teeth may readily be appreciated. But while the manner in which it is effected has as yet not been definitely ascertained, it is quite plain that the development of the teeth and jaws is, to a very large extent, governed by the activity of this highly complex glandular system.

*II. What is the Effect of the Disturbance Necessitating Bottle-Feeding Upon the Deciduous Dentition?*—The effect upon the deciduous dentition of the disturbances necessitating bottle-feeding is mainly in the form of malpositions. This phase of the subject, having been amply discussed a year ago, will not be referred to now. Modifications in form and structure of the deciduous teeth date farther back than the nursing period, as almost all the crowns of the temporary teeth are formed and calcified before birth. It is therefore of considerable interest to observe occasionally deciduous dentitions with anomalies in form and structure. Four such cases have come under my observation.

One case is that of an infant of three years, presenting a Class II, division 1, case of malocclusion. All the teeth present white opaque spots, the upper central incisors show slight fractures, and the lower incisors are diminutive in form. During pregnancy the mother suffered greatly from "heartburn," and to relieve it, she took a great deal of antacids. The teeth in this case are undoubtedly poorly calcified.

Another case, age seven years, Class I, shows extremely small lower central incisors, the crowns measuring 3 mm. in width and 2.5 mm. in length; the smallest deciduous central incisors in my collection measure 3.7 mm. in width. The lower lateral incisors are missing, while all the upper incisors show extreme wear. During the eruption of all the teeth, lancing had to be resorted to in order to facilitate the process. The mother, although an apparently robust woman, was ill throughout the period of gestation, and during parturition instruments had to be employed. She succeeded in nursing the infant for three months, during which time the baby thrived very poorly. Bottle-feeding was then resorted to for about two years. The deciduous teeth in this patient are all still firm, and the first permanent molars have as yet not appeared. The two other cases showed marked enamel hypoplasias in the lower deciduous molars and a tendency to extensive decay.

Following the experimental and clinical evidence brought forth in conjunction with the ductless glands, it may be concluded, as far as our present knowledge will permit, that all calcium metabolic processes in the living body are governed by the functional activity of the internal secretory system. Any deviation from the normal in the function of this system will produce a corresponding perversion in the processes depending upon it. Conversely, any defect in the structure of a part depending for its perfection upon calcium metabolic processes, may be referred to some disturbance in the internal secretory apparatus. It may, therefore, be seen that the defects observed in the deciduous teeth of the infant are due to some disturbance in its ductless glands. But as the mother's influence, owing to the normal functioning of this apparatus, corrects these shortcomings in the fetal stage through the placental circulation, and in infancy through lactation, it must be deduced that, in such cases, the internal secretory apparatus must have been defective also in the mother.

*III. What Testimony Besides Malocclusion Does the Permanent Dentition*



*Bear of Nutritional Disturbances Prevalent During the Nursing Period?*—In a paper by Wm. M. Thompson<sup>13</sup> it has been shown that the thyroid glands have a marked influence upon lactation. Hertogue<sup>14</sup> believes that thyroid given to lactating women increases the flow of milk, and Bang<sup>15</sup> states that the active principle of these glands is excreted by the milk. Almagha<sup>16</sup> in his experiments demonstrated that, by removing the thyroid apparatus from young puppies, no ill effects were produced while they were suckled, but when this was suddenly stopped the animals died. It may thus be seen in what intimate relationship lactation and internal secretion really stand. Furthermore, as the calcification process of the permanent teeth is not manifested until after birth, at a period coincident with that of lactation, it may be evident that disturbances occurring in the internal secretory apparatus, giving rise to difficulties in milk secretion, would create certain conditions which may involve the development and calcification of the teeth themselves. It may, therefore, not be improbable that in the search for etiologic factors of malocclusion, a clue may also be found in the study of cases exhibiting various forms of anomalies observed in connection with internal secretory disturbances.

*Special Studies.*—It has been experimentally demonstrated in lower mammals that disturbances in the internal secretory apparatus bring about, besides disorders of a general nature, also structural alterations in the tooth material, modifications in the size and form of the teeth, and irregularities in the sequence of the process of dentition. These findings have also been verified by observation of various investigators in the study of similar disturbances in the human species, as in cases of rhachitis, acromegaly, cretinism, etc., where the calcium metabolic process is perverted. If, therefore, malocclusion of the teeth is merely a local manifestation, resulting simply in a derangement of the teeth in the dental arches, the dental disturbances observed in conjunction with impaired internal secretion should be either entirely absent, or only rarely, i.e., accidentally, present. If, on the other hand, occlusal anomalies *do* stand in some relationship with disturbances of internal secretion, the accompanying features observed by investigators and experimenters should also appear in this connection, and that with some constancy.

With the purpose of testing this hypothesis, the study of a number of cases was undertaken. It was of interest to learn whether the appearance of the accompanying features observed in conjunction with internal secretory disturbances is constant, and if so, what is the extent of their frequency? Also, to what degree do they develop? To make this investigation of value, it was deemed advisable to base the evidence gathered upon the following requirements:

(1) If malocclusion of the teeth is in some manner brought about through the agency of the internal secretory apparatus—which also appears to be an important factor in tooth formation—there should be noticed some demarcations on the teeth indicating structural changes that may have taken place during the course of their formation.

(2) If malocclusion of the teeth is in some way connected with internal secretion, there should be also some complications manifested in some changes in size or form of individual teeth; for, as proved by experimentation, the teeth

in ectomized animals appear modified in form or considerably smaller than those in normal ones.

(3) As disturbances in the internal secretion bring about irregularities in the sequence of eruption and shedding of teeth, it should also be noticed in conjunction with occlusal anomalies, if there is any connection between the two.

The figures obtained from the cases examined may be tabulated as follows:

Number of cases examined	Enamel defects on crowns of teeth	Anomalies in form of crowns of teeth	Irregularities in shedding of deciduous teeth		Irregularities in eruption of permanent teeth	
			Premature	Delayed	Premature	Delayed
149	65	19	37	61	32	79

As will be noticed from this table, the figures under consideration group themselves under the following headings: 1. Enamel defects on the crowns of the teeth. 2. Anomalies in form and size of the crowns of the teeth. 3. Irregularities in shedding of the deciduous teeth. 4. Irregularities in eruption of the permanent teeth.

In order to elucidate these topics more clearly, it will be necessary to treat them separately.

1. Enamel defects on the crowns of the teeth. Of the number of cases examined, 65 showed such defects. These varied in a rather wide range, showing in some cases simple indentations on the labial or buccal surfaces of certain teeth; in other cases the demarcations are so extensive as to simulate the ripples observed in cretin skulls, as may be seen in Figs. 9 and 10, while in several cases the enamel covering was markedly atypical, appearing in a very limited degree and irregularly deposited, as may be seen on the upper incisors in Fig. 11.

2. Anomalies in the form of the crowns of the teeth. The frequency with which these anomalies appear is rather moderate, and the variety large. Thus in one case there may be observed a difference in the size between the two upper lateral incisors, as in Fig. 12, while in another case a diminution in the form of a certain tooth on one side is counterbalanced by an exaggeration in size of its mate on the opposite side of the dental arch, as in Fig. 13, the first premolars; a difference in form of the second premolars may also be observed in this figure.

3. Irregularities in the shedding of the deciduous teeth. The disturbance in the sequence of dentition is very extensive, as observed in connection with occlusal anomalies. Thus, of the number examined, 98 cases showed such irregularities. By far the greatest number are noted in those cases where the deciduous teeth persist for a longer period than normal; in some cases they are observed to persist to the twenty-fifth year. The premature loss of the deciduous teeth, though not as frequent, appeared in 37 cases.

4. Irregularities in the eruption of the permanent teeth. The greatest number of cases to exhibit one particular feature was observed under this heading;

111 instances demonstrating this character. While 32 cases showed instances of premature eruption, 79 exhibited delays in this process.

*Resume.*—To sum up the evidence brought forth in this paper, it may be stated that, by the investigations referred to, it has been demonstrated—

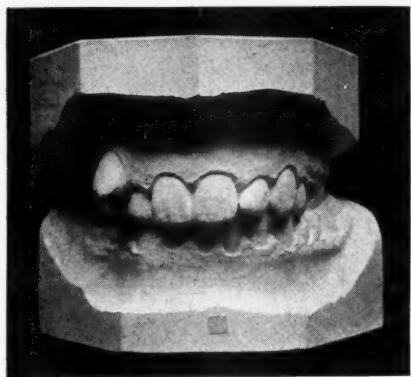


Fig. 9.—Case of malocclusion, showing ripples in the enamel formation of the teeth.

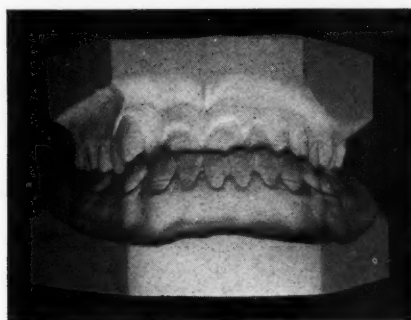


Fig. 10.—Case of malocclusion, showing ripples in the enamel formation of the lower teeth.

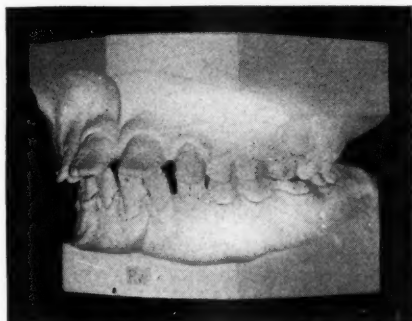


Fig. 11.—Case of malocclusion, showing irregular deposition of enamel on the labial surface of the upper incisors.

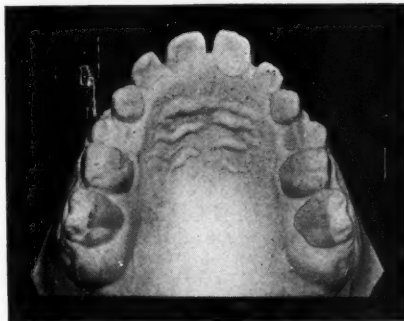


Fig. 12.—Model of upper denture of a case of malocclusion, showing difference in size of the lateral incisors.



Fig. 13.—Model of upper denture of a case of malocclusion, showing difference in size of first premolars and difference in form of second premolars.

(1) That malocclusion of the teeth is found to be intimately related to conditions that interfere with normal breast-feeding. Of 134 cases examined, 83 per cent were found to be bottle-fed.

(2) That results obtained by experimentation demonstrate that definite

anomalies in the teeth and jaws may be produced in lower mammals by artificial disturbances created in the internal secretory glands.

(3) That a close relationship is found to exist between malocclusion of the teeth in the human being and such anomalies of the denture as are produced by experimental disturbances of the internal secretory apparatus. Of 149 cases of malocclusion examined, there were 65 malformations in the enamel-covering of the teeth; 19 anomalies in the size and form of the teeth; 98 irregularities in the shedding of the deciduous teeth, and 111 irregularities in the eruption of the permanent series.

It may therefore be concluded that of the numerous factors that enter into the etiologic problem of malocclusion of the teeth, *internal secretion* is the one which may, in a large measure, account for many mysteries that perplex the orthodontist. The appreciation of the paramount importance of this factor will be evident in proportion as more knowledge is gained with reference to the profound working of this most wonderful system of glands.

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- <sup>15</sup>Bang: Quoted after Thompson.
- <sup>16</sup>Almaga: Quoted after Thompson.

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#### Pyorrhoea Alveolaris

The United States Public Health Service reports an examination of 190 cases. One hundred and eighty-seven showed the endamoeba. Eighty-seven of these were treated with emetin, but none lost it permanently. Improvement of the condition of the teeth and gums was noted in 22. Two remained stationary and one became worse. While emetin is an amoebicide, it will not alone cure pyorrhoea.



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## EDITORIALS

### Prosthetic Dentistry, Orthodontia, and Crown and Bridge Work

AT the meeting of the American Institute of Dental Teachers held recently in Minneapolis, the program referred to a report of a committee on prosthetic dentistry, orthodontia, and crown and bridge work. We are of the opinion that it was the intention of the executive committee of the Institute to have the committee report on the proper method of teaching these branches in dental schools on the basis of the four-year curriculum. On receiving the program from the secretary of the Institute the question occurred to us, "What has orthodontia to do with prosthetic dentistry and crown and bridge work?" We do not claim that orthodontia is too elevated a profession to be associated with the branches mentioned, but we feel that it should not be connected with those departments from an educational or teaching standpoint. We remember the time when it was considered proper to have the professor of prosthetic dentistry teach orthodontia. That was, however, before orthodontia was practiced as a specialty and before it was considered a science as it is today. In the first place, orthodontia

has no more connection with prosthetic dentistry than oral surgery has with prosthetic dentistry; in fact, it has no more connection with prosthetic dentistry or crown and bridge work than with any other branch of dentistry. The only relation that orthodontia bears to prosthetic dentistry is that orthodontia is based on the science of occlusion, and occlusion should be the basis of all dental operations. To that extent orthodontia is related to prosthetic dentistry, and to that extent only.

Simply because there are a few mechanical devices used in adjusting the teeth, it must not be supposed that orthodontia should be classed with mechanical dentistry any more than operative dentistry is classed with prosthetic dentistry because a few instruments are used in the filling of teeth; in fact, at the present time the least work in orthodontia is the mechanical part. It is true that we have to use regulating appliances to put certain forces on malposed teeth, but those regulating appliances should be used with a knowledge of physiology, anatomy, and histology, and that knowledge should be the principal factor involved. Any appliance that does not exert force on malposed teeth in accordance with physiological laws is defective, regardless of how fine a piece of work it may be from a mechanical or constructive standpoint. Orthodontia is more closely related to histology and physiology than it is to prosthetic dentistry.

In regard to orthodontia in the dental college curriculum, it is our belief that great advancement will be made when the subject is separated from prosthetic dentistry and crown and bridge work. There may be no objection to the same man teaching prosthetic dentistry and orthodontia, but if he does, it should be because he has mastered the two subjects from separate standpoints, and not because the two subjects are correlated. Orthodontia and oral surgery are more closely related at the present time than are orthodontia and the subjects to which reference has been made. In both orthodontia and oral surgery an intimate knowledge of anatomy, histology, and physiology must be the basis of practice. In orthodontia and oral surgery certain instruments and mechanical devices are used to correct certain deformities, but those instruments and appliances are used with a knowledge of the physiology and anatomy of the parts involved. It is unfortunate for the dental curriculum, the dental student, and for orthodontia as a specialty to have the latter continually thought of as being a department of prosthetic dentistry, and not a separate science. The sooner the executive committees of dental societies, the "powers that be" in these societies, and the men associated with the management of dental colleges reach the conclusion that orthodontia must be separated from prosthetic dentistry—the same as oral surgery, physiology, and anatomy have been separated from operative dentistry—the sooner will orthodontia be taught as it should be, and the proper recognition given to it by the dental student.

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#### Dental Libraries

**D**URING the past few months we have had brought to our attention the woe-ful lack of good dental libraries, both in the dental college and in the office of the dentist. In visiting the offices of a large number of dentists in various cities, one cannot help noticing the dental library—principally because it is so

small. It has been said, "Tell me what you read, and I will tell you what you are." That may apply to the dentists and, if we should judge them by their libraries, we would find that very few of them would be classed as dentists. In some dental offices we find quite a collection of books on subjects not relating to dentistry, but, taken as a whole, the dental and medical books are very few. Occasionally there are dentists who possess dental libraries, and these dentists are divided into two classes—the man who buys dental books to read and the man who buys books only to place on shelves. We know of several large dental libraries owned by private individuals who have made it a habit to collect dental books, but who fail to make it a habit to read them. Of course, these individuals are to be commended for their part, as in a few years the libraries will probably pass into the hands of some institutions which will make use of them.

The dental library in the dental college is practically a thing that exists only in name. It is true that dental colleges receive volumes on dental subjects from publishers, as specimen copies of such books are sent to the colleges gratuitously, to be reviewed and placed in the libraries. The college library is, however, generally given a place in the private office of some individual—the dean or secretary of the school—and carefully guarded from the eyes and hands of the student. Consequently, so far as the student body is concerned, the library in a dental college is practically of no value. There are few schools that make an attempt to procure a library for the benefit of the students, and the selection of books is, as a rule, very poorly planned. In fact, the greater number of the books usually found in these libraries will be on the subject in which the dean or secretary is particularly interested. If either of these individuals is interested in one or two special subjects, the remainder of the collection of books is very poor. Works on anatomy, physiology, and chemistry are decidedly rare in a dental library, while they should be the basic subjects on the student's course. When we consider books on oral surgery and orthodontia, or subjects which may be termed specialties of dentistry, we find those subjects are more neglected than any other.

While we realize that the question of a dental library in the dental college is a rather new phase of education, it is nevertheless a feature of educational work that must be considered, and the future of dental education depends to a certain extent on a properly selected reference library that is accessible to the student.

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#### **Permanent Staff Appointments for the Forsyth Dental Infirmary for Children**

**A**N examination of graduates in dentistry (of less than three years' standing) for appointments to positions on the Permanent Staff for full and one-half time service will be held early in June at the Infirmary. Appointments will be made for one and two years as follows:

Full time service requiring every day, eight hours per day, with one afternoon off a week, at a salary of \$1,000 per year.

One-half time service requiring three and one-half hours per day either forenoon or afternoon, at a salary of \$400 per year.

These appointments will be made subject to satisfying the requirements of the Massachusetts State Board of Registration in Dentistry.

Members of this staff will be entitled to the advantages of reports and clinics by experts in the various branches of dentistry from different parts of the world, in addition to the numerous regular clinics and lectures. The operators on this staff have the advantage of the clinics and lectures of the Post Graduate School of Orthodontia.

All material and necessary operating instruments will be furnished; up-to-date apparatus including electric engines, sterile instrument trays, fountain cuspidors, compressed air and modern operating-room-type lavatories are available for use.

A diploma of service will be issued to each member of this staff who has completed this term to the satisfaction of the Trustees.

Application for the above positions should be made to Harold DeW. Cross, D.M.D., Director, 140 The Fenway, Boston, Mass., not later than May 15th. Information will be gladly furnished to anyone interested, also the date of the examination.

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#### **National Dental Association's Action Endorsed**

**T**HE following resolution was unanimously adopted at the last meeting of the St. Louis Medical Society:

Whereas, modern dentistry is an aid in the prevention and cure of many grave constitutional diseases as well as in the maintenance of general health, and

Whereas, the character of wounds about the hand and face inflicted by modern implements of war makes the services of competent dentists an indispensable aid to the Army Surgeon in time of service, and

Whereas, the efficiency of the Army both in times of peace and war depends primarily upon the physical fitness of its members, therefore be it

Resolved, That the St. Louis Medical Society heartily endorses the action of the National Dental Association in seeking such legislative enactments as will offer inducements to the better class of dentists to enter the Federal Service, and be it further

Resolved, That it petitions Missouri representatives in both branches of our National Assembly to support the efforts of the National Dental Association to secure three additional grades in the Dental Corps of the United States Army.

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#### **Heredity Versus Environment**

Only by constant selection of the best can any race ever be improved. No education, no environment of any nature, can ever make any appreciable progress, even though these same favorable surroundings may produce, through ages, a definite but indefinitely slow increment, which by constant repetition becomes slowly available in heredity, but by no means fixed, so that reproduction, true to the better type, can be depended on.—*Luther Burbank.*